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Vol. 51 DECEMBER, 1939 No. 4

The Wilson Bulletin

Published by the

Wilson Ornithological Club

Ann Arbor, Michigan

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THE WILSON BULLETIN

is published quarterly in March, June, September, and December, as the official organ of the Wilson Ornithological Club, at Ann Arbor, Michigan, and is sent to all members not in arrears for dues. The subscription price is $1.50 a year, invariably in advance, in the United States. Single numbers, 50 cents. Outside of the United States the rate is $1.75. Single numbers, 60 cents. Subscriptions should be sent to the Treasurer.

All articles and communications for publication, books and publications for review, exchanges, and claims for lost or undelivered copies of the magazine, should be addressed to the Editor.

The current issue of *The Wilson Bulletin* is printed by the Ann Arbor Press, Ann Arbor, Michigan.

Entered as second class matter July 13, 1916, at Ann Arbor, Michigan, under Act of Congress of March 3, 1879.

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THE WILSON BULLETIN
A QUARTERLY MAGAZINE OF ORNITHOLOGY
Published by the Wilson Ornithological Club

Vol. 51 DECEMBER, 1939 No. 4

VAUX SWIFT IN LOUISIANA

BY GEORGE H. LOWERY, JR.

LOUISIANA is the wintering ground for many distinctly western species and subspecies. Recent records for the Rufous Hummingbird, Golden-crowned Sparrow, Bullock Oriole, and others indicate a definite tendency for even far western forms to move southeastward to the lower Mississippi River valley during the winter.

In spite of familiarity with this phenomenon, I was much surprised when swifts taken on the Louisiana State University campus, East Baton Rouge Parish, Louisana, on February 9 and 15, 1939, proved to be the Vaux Swift (*Chaetura vauxi*). Aside from extending the known range of the species many hundreds of miles eastward, these records constitute the first known occurrences of the Vaux Swift within the boundaries of the United States during the winter months, previous records for that season coming from Mexico and Central America.

The first record of swifts in Louisiana in winter was in 1937–38, when I saw two individuals almost daily from November through February. One of the individuals was captured and banded on February 16, 1938 (U. S. Bureau of Biological Survey band number 38-114000). Since I had no thought of its not being an ordinary Chimney Swift (*Chaetura pelagica*), I did not examine it as critically as I should and it was put on record as belonging to that species (*Cf.* H. C. Oberholser, "Bird Life of Louisiana," *La. Dept. Conserv. Bull.*, 28, 1938, 353).

During November, 1938, swifts were again noted in the same chimney on the University campus. This time a larger number, varying from five to ten, was seen. They were observed almost daily during the period from November through February. When it appeared that they intended to remain throughout the winter, efforts were made to capture them for banding purposes. Six specimens were caught, five of which were banded and released (numbers 39-47001 to 39-47005). The sixth specimen was preserved as a study skin. Only after being placed among specimens of *Chaetura pelagica* in the Museum of Zoology collection was it noted that the bird differed from that species. Since it was smaller and paler it was immediately suspected of being *Chaetura vauxi*. The question then arose as to whether the five birds banded and released

were identical with the one made into a skin. These were recaptured on February 15, along with four additional unbanded birds and all proved to be the smaller and paler species. These four unbanded birds were retained as museum specimens; the others were released. Although a few swifts were observed at this chimney throughout the remainder of February and all of March, it could not be determined whether they were the Vaux Swift or incoming migrants of the Chimney Swift. On April 2, 115 swifts were captured at this chimney. All proved to be Chimney Swifts and were therefore banded and released.

After careful comparison with material kindly loaned by the Museum of Vertebrate Zoology of the Univeristy of California, and the Bureau of Biological Survey, it is obvious that the five specimens taken at the University in February, 1939, belong to *Chaetura vauxi*. Both Dr. H. C. Oberholser and Mr. George Willett have examined the specimens and confirm this identification. It is probable that the specimen captured and released in February, 1938, was also of this species.

The five specimens, all females, available for study measure as follows: wing, 116.5, 110.5, 112.6, 111.5, 115.0 mm. Four were washed before being prepared as study skins and present a markedly different appearance from the unwashed specimens. On comparison of the washed specimens with skins of *Chaetura vauxi* available from Mexico, California, Washington, British Columbia, and Alaska, they appear to be somewhat darker, particularly on the upper parts. The under parts are grayer. Probably this is due to the fact that specimens of *Chaetura vauxi* used for comparison are, with few exceptions, either breeding birds or birds collected in the United States during the northward migration, and thus are in more worn and faded plumage.

The Chimney Swift congregates in great numbers in certain sections of the southern United States during the fall months. At Baton Rouge the numbers recorded seem to exceed any other published estimates for the species. Several chimneys have been observed which simultaneously house between five and six thousand birds each during September and October. Banding records indicate that these flocks are continually changing in individual composition. When an interval of about ten days is allowed to elapse between trapping dates at any one chimney, the composition of the flock is observed to have changed almost entirely. Several conservative estimates have placed local populations of Chimney Swifts at Baton Rouge throughout the latter part of September and the first of October at 50,000 or more birds. If we assume only a minimum number of shifts in the population, we must conclude that the number of individuals passing through the region mounts to several hundred thousand. Banding of large numbers of these birds is accomplished with the minimum of difficulty. To date, 16,114 swifts have been banded and released, all within an aggregate of seven days.

The large flocks begin to dwindle during late October and, except for a few stragglers, are usually gone by the first of November. At

what time Vaux Swift makes its appearance is not known. In the West the species is said to be an early fall migrant, so it may perhaps appear here before the large flocks of Chimney Swifts have completely dispersed. It is questionable whether the two species can be positively identified except with the specimen in hand. A soot-covered Vaux Swift could be distinguished from a Chimney Swift only by its small size. However, now that the western species is definitely established as a winter visitor to Louisiana, all swifts handled in banding operations will be critically inspected.

Note: After this paper was in press, another specimen of *Chaetura vauxi* was captured at Baton Rouge. It was taken from a flock of several thousand Chimney Swifts on October 14, 1939, during the course of bird banding operations. This, I believe, constitutes the first instance in which the two species have been found together and confirms the suggestion above that Vaux Swift may appear in Louisiana before the large flocks of Chimney Swifts have dispersed. Like the other specimens of the Vaux Swift taken here, the October specimen proved also to be a female.

MUSEUM OF ZOOLOGY, LOUISIANA STATE UNIVERSITY,
UNIVERSITY, LOUISIANA

THE UPLAND PLOVER AT FAVILLE GROVE, WISCONSIN

BY IRVEN O. BUSS AND ARTHUR S. HAWKINS

THIS study was conducted on the Faville Grove Wildlife Area, a 2,400 acre tract composed of 10 farms, situated in Jefferson County, Wisconsin, two miles north of Lake Mills. It lies on the west bank of the Crawfish River, a glacial outwash stream meandering through wide level bottoms. The Upland Plovers (*Bartramia longicauda*) are confined in the Faville Grove area to these bottoms, 1,600 acres of which are within the plover range covered in this study.

Of this Upland Plover range, nearly half is pasture, nearly half is in corn, small grain, or hay; one quarter-section is ungrazed prairie hay meadow. The pastures include a few remnants of oak-hickory groves (*Quercus macrocarpa* and *Carya ovata*).

There are three soil types on this bottom: Clyde silt loam, Miami silt loam and peat. The plovers use only the Clyde and peat soils. We do not know whether this aversion to the Miami soils is due to the soil itself, or to the bush willows and oak-hickory groves which occupy it. In southwestern Wisconsin Upland Plovers are not confined to bottoms.

Population Trend

From 1870 to 1890, old residents at Faville Grove remember that "prairie pigeons" or Upland Plover were very common and "running all over the hayfields." Between 1895 and 1920 the same men remember no plovers, but John Hooper, in his journal, mentions a nest with four eggs in 1904. In 1920, at least one pair was seen during haying season. Apparently the birds slowly increased from 1920 to 1935, at which time the first census showed eight nesting pairs.

The upward trend at Faville Grove is attested by our census counts:

Year	Spring Count (1,600 acres)	Fall Count
1935	8 pairs	24 birds
1936	10 pairs	32 birds
1937	16 pairs	50 birds
1938	25 pairs	61 birds
1939	22 pairs	80 birds

Roberts reports a similar trend for Minnesota. He says (1932): "It was during the period from 1895 to about 1900 that it disappeared so rapidly from the whole southern part of the state. Gradually . . . the depleted ranks were recruited, and since about 1920 it has been once more in evidence. . . . Reports received during the spring of 1931 show clearly that the Upland Plover is reappearing in steadily increasing numbers. . . . "

Beck (1938) is also "impressed by the apparent increase within the last ten years" in central Pennsylvania.

Wetmore (1926) found a corresponding decline on the winter range in South America.

Pre-nesting Period

Spring arrival dates for the Upland Plover vary little from year to year:

Year	Arrival Date	Year	Arrival Date
1935....	April 14	1938....	April 13
1936....	April 19	1939....	April 22
1937....	April 14		

The first birds to arrive always appeared in the same field during each of the past five years. Perhaps this field is the nesting territory of individuals that always come early. The successive arrivals settled upon the fields which later became nesting territories.

Censuses repeated every few days show that there is a gradual and steady infiltration of birds from the arrival date to about two weeks later, at which time all the local birds have arrived. We found no evidence that transient birds stop here in the spring.

Upland Plover separate into pairs and set up their home range soon after arrival; in fact, most of the birds are paired on arrival and exhibit courtship behavior when first seen. In 1938 all of the birds were paired within two weeks after the first arrival. The last birds to pair arrived as a group of six. We thought they were smaller than average and had less yellow on their bills. Could these be late hatches of 1937? (The physiological status of paired and unpaired plovers will be described in a later paper.)

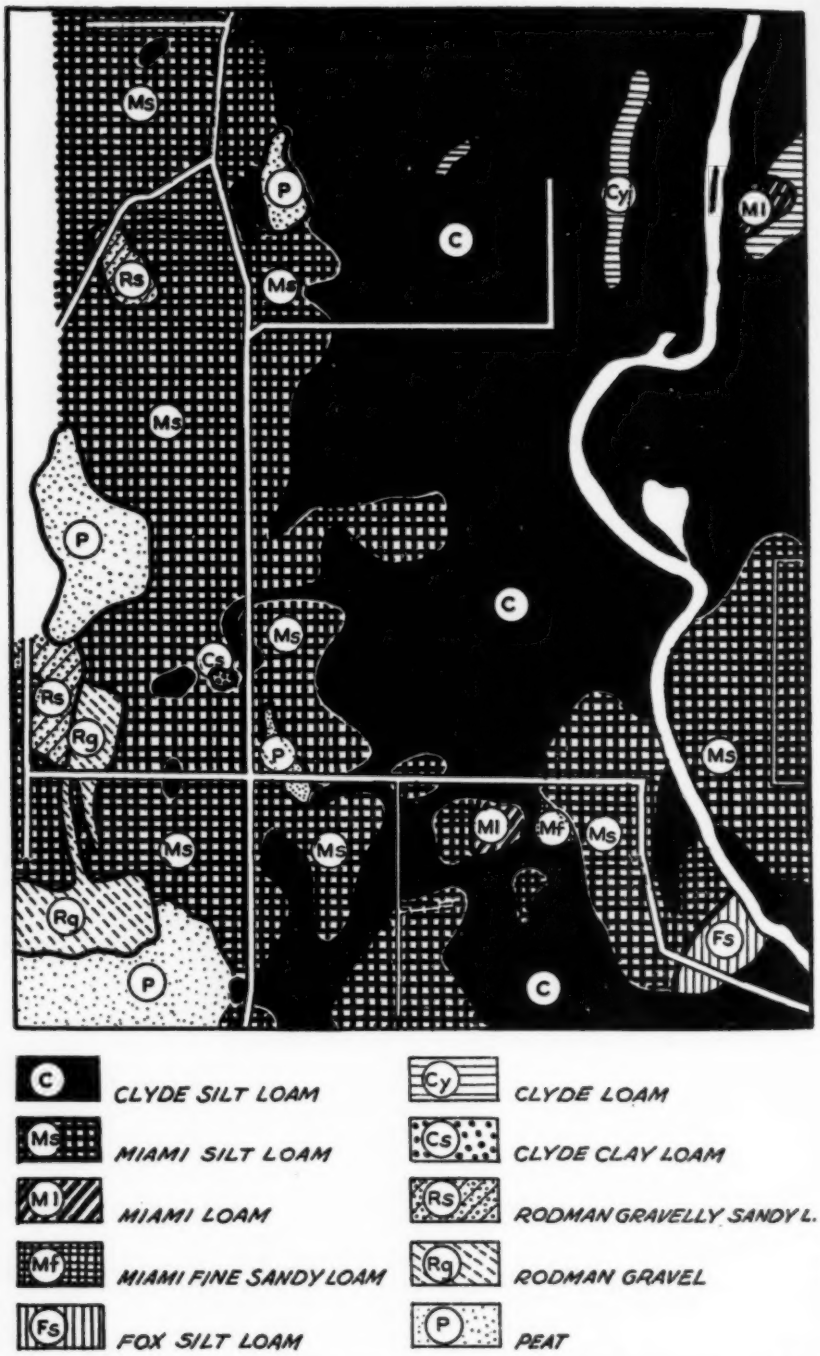
The nesting territories are usually grouped. Early in the season a paired male has been seen to resist and drive off another trespassing male. Such intrusion is believed to be accidental in some cases, the invader not seeing the pair in the tall grass. After all birds are paired and have established nesting sites, no fighting is seen.

As in other territorial species, stormy weather temporarily reverses the tendency to pair off. On May 3, 1935, a snowstorm caused all Upland Plover, paired and unpaired, to assemble into large groups which sought snowless spots on roads. After the storm subsided, the groups again broke up into pairs.

Courtship

The Upland Plover has no less than four call notes, of which two are distinctive and diagnostic of breeding ground phenology. One of these will be referred to as the short whistle, and the other as the long whistle.

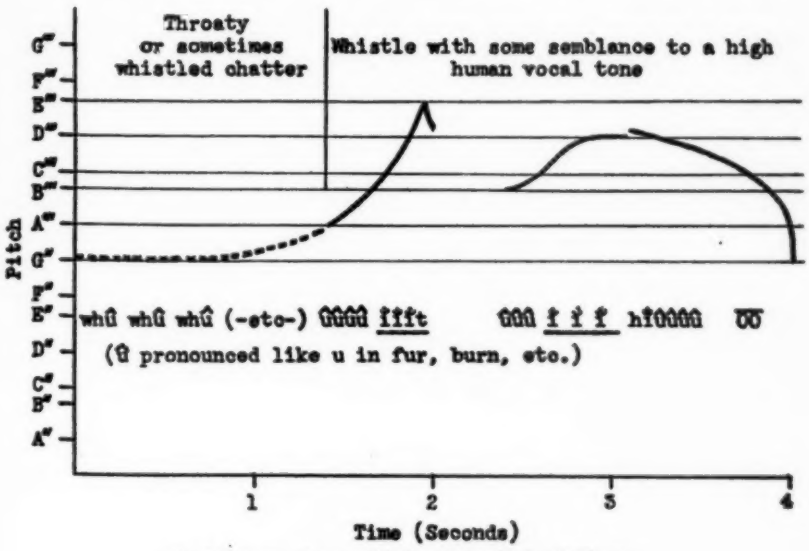
The short whistle consists of from six to ten short, very rapidly



Text Fig. 1. Soil types of Faville Grove wildlife area; 1½ inches equal one mile.

uttered syllables, all at the same pitch. This bubble-like *quip-ip-ip-ip-ip-ip-ip-ip* is given by both the male and the female from the time the birds arrive in the spring until they leave in the fall. Both birds give this whistle when flushed; after they have been sitting on a fence post for some time, while feeding or resting; or while in a straight a-way flight.

H. H. Axtell, after studying the long whistle at Faville Grove on May 20, 1937, wrote the following description: "It is introduced by a series of notes, all on about an even pitch, and delivered so rapidly as to form a sort of chatter, usually of a throaty quality but sometimes of a purer tone. After a second or so the chatter begins to rise in pitch and almost immediately becomes a smooth, unbroken whistled tone, slurring upward from the chatter which is pitched usually near the third G above middle C, through about three and a half tones to about the D above, where the tone is abruptly cut off with a quick grace note, like a 'catch in the voice.' In about two-fifths of a second the song continues with another gradual upward slur from about B to D where again there is a slight break in the voice, scarcely perceptible, after which the pitch descends in a long whistled wail." Axtell further describes the long whistle by syllabication, tone, quality, and time in Text figure 2. Both the male and the female give this whistle prior to the nesting season, either when alighting or when circling high in the



Text Fig. 2. Long whistle of the Upland Plover.

air. During the nesting season, after the female has flushed from her nest, the male will rise high over the nest and repeat this whistle until the intruder has left the vicinity. Such "protest" whistling by the male occurs only near its territory. No female has been known to give this

whistle during nesting season. This holds true for both incubating females and females which have lost their nests.

After the nesting season, both birds give the long whistle, but less frequently than prior to breeding. Both male and female use this whistle from arrival time in early spring until migration behavior begins in late summer.

The Upland Plover uses two characteristic wing beats while on the summer range: the "flutter stroke" and the long wing beat. The flutter stroke scarcely rises above the horizontal, and is followed by a long, slow glide. This stroke is too rapid for the eye to count accurately, but it has been timed at from six to nine strokes per second. The wing action seems mostly confined to the outer half of the wing. At the bottom of each stroke the outer wing seems curved downward at a considerable angle, like the wing of a duck which is dropping into decoys. The flutter stroke is used exclusively by both sexes from the time the first bird arrives in the spring until after the nesting season.

Immediately after nesting there is a gradual transition from the flutter stroke to the long wing beat. The long beat resembles the ordinary flight of the Killdeer or of the Yellow-legs, except that it is faster. It averages from three to five strokes per second. The up-stroke passes well above the horizontal. When at the bottom of the stroke, the wing does not appear curved as in the flutter stroke, and passes through a longer arc.

T. T. Waddell and H. R. Siegler (*letter*) remark of the flight habits in Colorado County, Texas: "Plover do not show mating flight upon arrival in spring. Near the time of departure they begin to hover over fence posts. Upon return in summer they do not demonstrate mating flight." Apparently the Upland Plovers leave their wintering grounds using the long wing beat and change to the flutter stroke before they arrive at the northern breeding grounds but after arriving in the Gulf States.

H. A. Hochbaum (*letter*) observed a single Upland Plover using the long wing stroke on May 2, 1939, at Delta, Manitoba. This was the first spring arrival he recorded for that region and may have been a bird migrating to its breeding ground farther north. The next day he saw three using the flutter stroke.

Weather affects the time plovers change to the long wing beat. A sudden drop in temperature causes an increase in the number of birds using the long wing beat.

Nesting Period

From 15 to 20 days after the first Upland Plover arrives in the spring, whistling decreases conspicuously, and birds are seldom seen. These are our first clues that nesting has begun and that nest-hunting must begin at once, for the entire nesting season is spread over a period of not more than two months.

Upland Plover

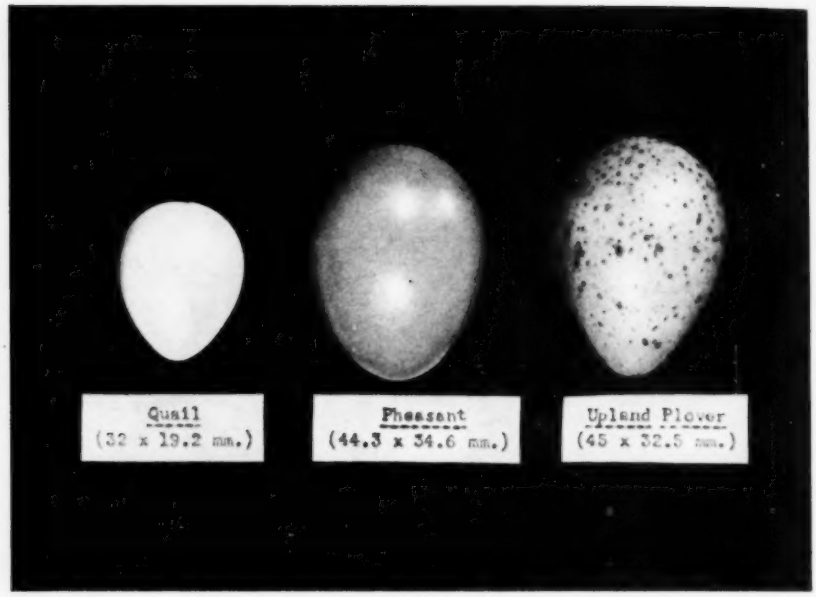


Fig. 1. Comparative size and shape of Upland Plover, Pheasant, and Bobwhite quail eggs.

Fig. 2. Hatched shells of Upland Plover, Pheasant, and Bobwhite quail, showing difference in the way the egg is pipped.

We found while making this study:

Year	Number of Nests	Area cruised
1935–36	2	No definite area covered
1937	21	70 acres
1938	26	240 acres
1939	7	No definite area covered

Occupied nests were found in numbers only in 1938. Most of the 1937 nests were found after the eggs had hatched and while we were cruising cut-over hayfields for nests of other game birds.

Two methods of nest-hunting were used during 1938. In hay, the crew combed the field walking slowly abreast, each man parting the vegetation with a stick. The distance between individuals was 6 to 10 feet, depending upon the density of the cover.

In tussock pastures a drag method was found to be most efficient. The drag is either a piece of conduit piping 12 feet or more in length, closed at both ends and partly filled with stones, or two cane poles lashed together in such a manner that they rattle as they bounce from tussock to tussock. Someone walks behind the drag to mark the spot from which the bird flushes. We found that incubating Upland Plovers flushed only after the drag crossed the nest. We tried using chain and rope as drags but found they often failed to flush the plover.

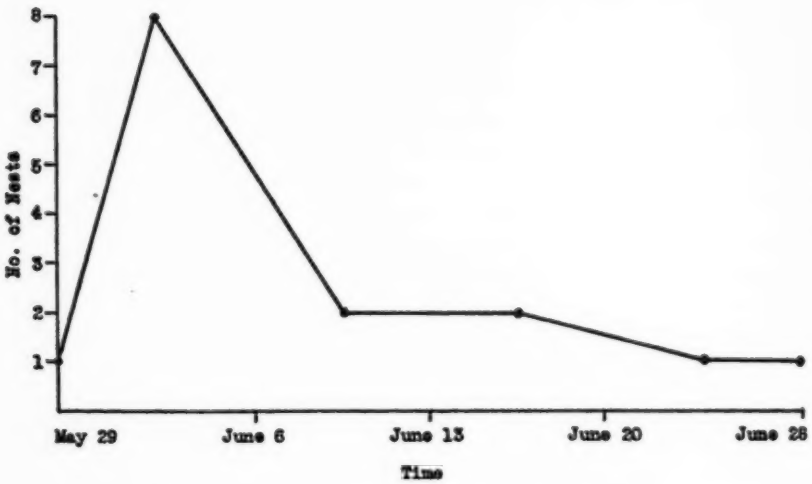
The actions of the male unmistakably reveal the whereabouts of the nest, provided the female has been flushed from it. He circles over the site, giving the long whistle. The flushed female usually flutters about 30 yards from the nest, giving the short whistle during the presence of the intruder. As the intruder comes nearer to the nest, the female comes in closer and whistles at shorter intervals.

In 1938 the first eggs were laid May 8 and hatched May 29. Text figure 3 shows the distribution of hatching dates for 15 nests. Hatching dates for 10 nests were actually observed, while for five the dates were deduced. Dates for 11 nests were discarded because hatching dates could not be interpolated closely. The steep initial rise of the curve supports the conclusion, first drawn in 1937, that Upland Plovers begin nesting almost in unison. The single peak shows that 53 per cent of all nests hatched within the first nine days of the hatching period. Hungarian Partridge (*Perdix perdix*) and Pheasants (*Phasianus colchicus*) using the same range showed, at least in 1937, a double peak. The second peak is believed to represent re-nesting of birds whose first attempts were unsuccessful.

The total spread of the hatching dates of Upland Plovers for 1938 was 31 days; for 1937 it was less, perhaps only 20 days. The total spread for Hungarian Partridge and Pheasants in 1938 was 100 days. The latter half of the plover curve may represent the later nesting of yearling birds and the re-nesting of a few others.

Evidently Upland Plovers began nesting earlier in 1935 and 1936 than they did in 1937 and 1938. On June 13, 1935, a nearly full-grown

plover was observed. In 1936, two broods of nearly full-grown plovers were seen on June 19.



Text Fig. 3. Distribution of Upland Plover hatching dates (1938).

Extreme individual differences have been observed in incubating birds. Seventeen incubating plovers were kept under observation during 1938; each nest was visited every other day until the 18th day, after which it was visited daily. During each visit the flushing distance was recorded. Invariably each bird had its characteristic flushing distance. Some would not allow the observer to approach closer than 6 feet. Others allowed the grass to be parted above their nests, and in several cases the observer actually touched the bird's back without flushing her. In two cases the incubating birds flushed regularly at about 4 feet, but on the day of pipping the birds refused to leave the nest in spite of our touching them.

Flushing Upland Plovers from their nests did not cause them to desert. Of the 17 nests periodically visited in 1938, not a single bird deserted. One bird was flushed 19 times. This unwilingness to desert is corroborated by Barton Sharp of Lancaster County, Pennsylvania, who tells us that he made a pull-string trap out of hardware cloth about 4 feet square and set it over the nest. When the plover was on the nest he tripped the trap and banded her. Even such rough treatment caused no desertion.

Damage to an egg, however, causes immediate desertion. At Faville Grove during 1938, a bird deserted after incubating for 14 days. All the eggs seemed in good condition and the nest was unmolested, but upon

closer examination a very small hole was discovered on the side of one of the eggs. On May 17, 1939, and in May, 1939, birds deserted their nests under nearly identical circumstances. In all three cases the hole appeared to be of the same size and when found occurred at the under side of the egg. What causes these punctures is unknown. Entomologists we have consulted know of no insect which punctures eggs.

The highest nesting density for any one field in 1937 and 1938 was 1½ acres per nest. Other fields ranged from 2½ to 15 acres per nest.

Re-nesting

The first plover hatched in 1938 on May 29. Allowing three weeks for incubation and four weeks for the dependency of the young, a second brood could not reach mature size before September 1. Very few birds remain at Faville Grove until September 1; hence a second brood would have no time to prepare for migration. We therefore conclude that, at this latitude, the time-schedule alone precludes the possibility of second broods in this species.

We have strong evidence, however, that early nesting failures are sometimes followed by further attempts to nest. One evidence of re-nesting is that we found more nests than plovers. Thus in 1937 our census of breeding plovers was 20 pairs, and we found 19 nests. We also found remains of 10 broken eggs which probably represent three additional nests, and two broods so recently hatched that the chicks could be caught by hand. These were far from known nests and must represent two more nests. It is, of course, incredible that on a range of 1,600 acres all the nests should be found or accounted for. Since 20 pairs produced at least 24 nests, the Upland Plover must re-nest in some cases. A similar excess of nests over pairs was found in 1938.

Further, though less conclusive, evidence for re-nesting is found in the observed history of a pair occupying an isolated territory. On May 17 this pair was observed mating. Two days later a nest containing a complete clutch of eggs was found about 100 yards from the site of mating. Later this nest was deserted. On July 16 a nest containing three hatched shells was found within the territory of this pair. The instance is not conclusive, for we cannot prove that both nests were built by the same pair. L. E. Hicks tells us that Upland Plovers re-nest in Ohio if the season is not too far advanced.

While some pairs re-nest, there is evidence that not all nesting failures are followed by re-nesting. On May 3, 1938, a field which had been used regularly by eight plovers was plowed. The behavior of birds, both during and after plowing, indicated two nesting pairs. After plowing, two pairs remained for six weeks, but nesting behavior ceased. They did not whistle, they did not hide, they were not wary, and in general they displayed the behavior of birds whose family duties were over.

Incubation Period

Bent (1929) wrote, "The incubation period is said to be 17 days, but this needs confirmation."

In 1937 Cleveland Grant observed an Upland Plover nest near Chicago in which the last egg was laid at 4:00 P.M. on one day and incubation had started the morning of the next day. It may have started during the night. This nest hatched on the 21st day after the beginning of incubation.

On May 11, 1938, at 3:00 P.M., an incubating bird was flushed from her nest of four eggs. At 5:00 P.M., a second incubating bird was flushed from her nest of four eggs. This same ground had been carefully cruised the day before, but no birds flushed from their nests; hence it is assumed that we flushed the birds on their first day of incubation. The nest found at 3 o'clock hatched on the 21st day at 10:00 A.M.; the nest found at 5 o'clock hatched on the 21st day at 6:00 P.M.

The period of incubation seems established at 21 days. The period of pipping, however, may be prolonged for as much as three days. In 1938 two nests pipped on the 21st day, but neither of them hatched until the 24th day. Other nests began hatching within an hour after pipping. The reason for prolonged pipping possibly lies in the negligence of the parent; in the two observed cases the incubating bird was absent from the pipping eggs during each of nine visits made at different hours during three days. In both cases all the eggs hatched, and the chicks apeared strong. Not all individuals are negligent during pipping. One incubating Upland Plover, after flushing during each of 10 visits, allowed herself to be touched while her eggs were pipping, yet she did not flush. Gallinaceous game birds are supposed to "sit tighter" during pipping.

Nest and Eggs

Our observations conform to the nest description given by Bent (1929): "The nest was on a knoll in a sheep pasture where the grass had been cropped except for scattered tufts. . . . In one of these tufts, about a foot in diameter, a hollow had been scratched, 4 or 5 inches in diameter and nearly 3 inches deep; it was lined with small bits of dried grass and held four handsome eggs. Since then I have found several nests in Saskatchewan. These nests were all similarly located on the dry, grassy prairies, in slight hollows in the ground, about 4 inches in diameter and 2 inches deep, generally well hidden in rather long, thick grass; they were lined with pieces of dry grass, and the growing grass was artfully arched over them for protection."

Upland Plover nests are well hidden. We are not certain that the growing grass is artificially arched over the nest, but if it is not, then the old bird is usually careful to select only a site that will render the nest invisible from above. At the time nesting begins, such sites occur in

pastures largely in the tufts of tall grass fertilized by last year's cow dung. A high percentage of pasture nests was found in these tufts. In hayfields, nests were located in clumps of timothy or June grass, and had one side-opening only. Actual construction of the nest may not begin until after the first egg has been laid. In prairies, nests were usually located at the leafy base of an herb or shrub which obstructed vision from above. A late nest was placed beneath a prairie rose (*Rosa setigera*), which bloomed just as the eggs hatched. The flowers overhung the nest, and supplied under-cover which at that season was lacking in the rank vegetation surrounding the nest site. Roberts (1932) describes a similar case. He found one in early June "most beautifully placed beneath a bunch of pasque flowers, the leaves and fruiting plumes of which completely covered and embowered it, leaving only an entrance on one side."

Among American game birds, the Upland Plover has one of the largest eggs in proportion to the bird's size. Bent gives the measurements of 66 eggs in the United States National Museum as averaging 45 by 32.5 millimeters. Pheasant eggs at Faville Grove average 44 by 34 millimeters. A mature Pheasant weighs about six times as much as an Upland Plover, yet their eggs are similar in size. Bob-white (*Colinus virginianus*) eggs at Faville Grove average 32 by 19 millimeters. A mature Bob-white and a mature Upland Plover each weigh about 200 grams, yet the plover's egg is much larger. Plate 8 shows the comparative egg size and egg shape of these three species.

All completed clutches at Faville Grove consisted of four eggs, but there are reliable records that clutches of five sometimes occur. The American Museum of Natural History contains 11 sets of eggs taken by H. B. Bailey at Vermillion and Flandreau, South Dakota, in 1882. One set consists of five eggs, measurements of which show that its total volume was not much greater than the total volume of four normal-sized eggs. Of 30 other sets in the American Museum, 3 are incomplete and 27 consists of four eggs each. B. L. Sharp found four nests during the summer of 1938, one of which contained five eggs. Bent says, "The Upland Plover lays four eggs, rarely five. . . . "

Clutches containing less than four eggs are difficult to appraise, since the occurrence of three or two eggs may represent an incomplete clutch, or predation, or even the work of egg collectors. A nest under observation in 1938 contained four eggs from May 26 to June 4, but on June 5 only three. Incubation continued and no clue was found to the disappearance of the egg.

Like gallinaceous birds the Upland Plovers sometimes drop eggs in locations other than the nest. Two such "dropped eggs" were found, one of which had a "soft" (incompletely calcified) shell.

Fertility and Pipping of Eggs

Of 104 eggs followed through to hatching, only three were infertile,

and none contained dead embryos. This indicates a higher fertility than Pheasants or Hungarian Partridge eggs showed on the same area during the same period.

The Upland Plover's manner of pipping is unusual. Both the Bob-white and the Pheasant pip the egg at right angles to its major axis, whereas the Upland Plover pips its egg parallel to the major axis, thus emerging from the side instead of the end. Plate 8 shows the hatched shells of a Pheasant, a Bob-white quail and an Upland Plover.

The shell is so fragile that the hatched chick often tramples and breaks the empty shells before it leaves the nest. The absence of a "cap" maks it hard to distinguish hatched shells from eggs broken before hatching. Moreover, it was found that empty shells had disappeared from 54 per cent of the hatched nests, evidently carried away by the mother bird. All three peculiarities make it difficult to interpolate the history of a hatching from egg shells.

Generally only the shell from the first-hatched chick is removed from the nest, but in two cases the shells from two hatched chicks were removed. The distance removed varied from 35 to 100 yards. This discovery of shell removal accounts, we believe, for some of the scattered stray shells found during previous nesting studies.

Upland Plover eggs of a given clutch do not pip or hatch simultaneously. The elapsed time from the first pipped shell to the last hatched egg varied from 18 hours to three days. The usual time was 24 hours. After the first chick hatches, the others follow at intervals of about two hours. Although this interval between chicks varies in different clutches, in any one clutch it seems to be very uniform.

Once a chick is out of the shell, it loses no time getting out of the nest. The first chick to hatch is usually out of the nest before the last chick has freed itself from its shell.

Eggs always hatched less than a day apart, and no incubating plover was ever flushed from an incomplete clutch. These facts indicate that incubation in this species never begins before the clutch is complete.

Choice of Nesting Sites and Success of Nests

Table 1 shows the prevalence of nests in different cover types. The data represent the actual choice of sites, for in each of the two years we found as many nests as pairs, so there is no chance that the data show where we happened to find nests, rather than where the plovers nested.

The single nest found in 1938 in a hayfield of alfalfa and sweet clover is the first nest we have so far recorded in leguminous hay, and the second that we know of. Hess (1910), of Champaign County, Illinois, says he found a nest of four eggs in a clover patch on May 16, 1906.

Legume hays are exotics. Can the plover have an aversion for exotic plants? Hardly, for they nest in quack grass, June grass and in

canary grass. It seems possible, however, that some plants fail to fit the "innate perceptory pattern" of the plover, and thus are "avoided" as nesting sites.

TABLE 1.

CHOICE OF NESTING COVER SHOWING MORTALITY IN EACH TYPE OF COVER

Type of nesting cover	No. of nests		Unsuccessful nests		Predators
1938:					
June grass pastures	11		6		4 by cattle; 2 by skunks
June grass, timothy and quack hayfields	7		2		1 by Crow; 1 by mink
Ungrazed prairie	4		2		1 by Crow; 1 by skunk
Canary grass pasture	2		1		1 by cattle
Timothy hayfield	1		0		
Alfalfa-sweet clover hayfield	1	26	0	11(42%)	(5 by cattle, 3 by skunks, 2 by Crow, 1 by mink)
1937:					
June grass pastures	7		5		
June grass, timothy and quack hayfields	14	21		5(31%)	Predator not known
		47		16(34%)	

The choice of nesting sites possibly changes as the season advances. As between a pasture and an adjacent similar ungrazed prairie hay meadow, simultaneous cruising revealed only early nests on the former and only late nests on the latter.

The Upland Plover nest mortality (34 per cent) shown in Table 1 is only half that usual in gallinaceous game birds. Pheasants at Faville Grove lost 68 per cent of their nests in 1938. Mowing caused no mortality in plover nesting, but is one of the causes of high nesting mortality in Pheasants.

The loss by cattle arises from trampling, not exposure. The nests are built in ungrazed tufts about old dung. Such tufts are seldom cropped by cattle.

It is impossible to relate predation loss to nesting site. The short season, narrow range of cover conditions, and small number of nests all combine to prevent this.

In 1939, the shells from 15 eggs were collected from the ground beneath trees in which Crows (*Corvus brachyrhynchos*) had perched while eating the eggs. These shells represent at least four nests. Since our census showed there could be not more than 22 nests, Crows caused at least a 14 per cent nesting mortality in 1939.

TERRITORY

Each Upland Plover territory consists of a nesting site plus a loafing

and feeding ground. The nest belongs to the pair; the loafing and feeding ground is a community affair. The feeding and loafing field must be near the nesting site; a field occupied by plovers prior to the nesting season usually has one or more nesting sites close to or bordering it.

Observations at Faville Grove suggest a delicate distinction between acceptable and unacceptable nesting sites. A slight change in an accepted field may cause it to become unacceptable. We had the impression that heavy grazing, early grazing, standing water, burning and manuring all reduced or excluded nesting from fields accepted the previous year. Weeds and brush exclude plover.

These are reasons for rejection which we thought we could see; in other cases fields were rejected for no reason visible to us. A three-acre June grass and timothy hayfield was occupied by two pairs of nesting birds in 1937 and again in 1938; an adjoining June grass pasture of more than 30 acres did not attract nesting birds.

At Faville Grove grassy hay meadows or tussock pastures were usually selected as nesting sites.

The loafing ground consists of a pasture with low tussocks, a prairie meadow with sparse vegetation not taller than the plover's back, or a hayfield containing open patches that allow freedom of vision. The loafing ground must be adjacent to the nesting site to make it acceptable.

Plovers are hard to see in the nesting site until the eggs have hatched. During feeding and loafing hours the birds are easy to see on the loafing ground.

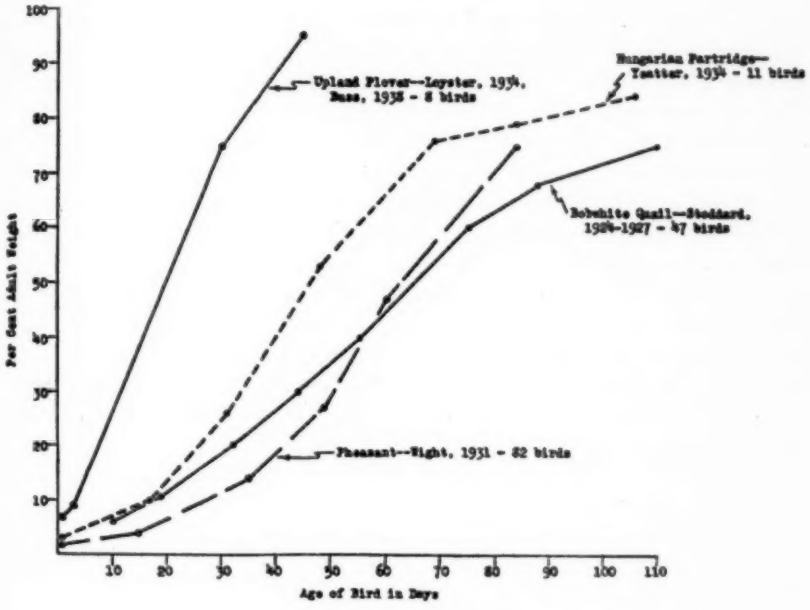
On one occasion we noted an attempt of the plover to keep its nesting site exclusive. On May 27, 1937, one bird of a pair repeatedly repulsed the attempts of another pair to enter its territory. On the loafing ground, however, there is no exclusiveness. We repeatedly saw pairs of plovers feeding, resting, flying or dusting peaceably side by side.

The distribution of nests in an accepted field is sometimes puzzling. In 1937, seven nests were found in a 17-acre timothy field. The nests were grouped into two well-defined areas which strongly suggested colonial nesting. This same field contained five nests in 1938, but there was no grouping. Single nests are seldom found in any field.

Post-nesting Period

Text figure 4 compares the rate of development of the Upland Plover with the rate of development of three other species. The curves for pheasants, Bob-white and Hungarian Partridge all are similar in shape and are nearly parallel. The abrupt rise of the curve for plovers indicates the rapid development of this bird. More weights are needed to make this curve accurate, but the general direction is unmistakable. The per cent of adult weight of the young plover is considerably higher than that for the other three species at hatching. The average weight

of the young plover at the time of hatching is about 14 grams. Within three days the weight increases to about 17 grams. Earl Loyster, studying Upland Plover raised by Mrs. Taylor in Milwaukee County, found that in 25 days tail feathers were emerging from their quill sheaths, in 30 days the young birds showed complete plumage and appeared full-grown, and in 45 days the characteristic short whistle was developed. Our observations also show young plover reaching mature appearance within 30 days.



Text Fig. 4. Growth rate of Upland Plover compared with Pheasant, Bob-white quail, and Hungarian Partridge.

Very few species are able to carry a band at the time they hatch. The young plover has such large legs that it can carry a band as soon as it leaves the shell. During 1938 we banded 18 such newly-hatched birds. Although at least two other persons have banded young Upland Plovers, we know of no one who has banded them immediately upon hatching. In 1938, Barton Sharp tells us that he "banded four young which (he) found running at large" in a pasture. "They were about four to five days old." On July 6, 1934, Loyster banded four young plovers which were raised in captivity and released in Milwaukee County. These birds were 18 days old at the time they were banded and released.

The first nest hatched in 1938 on May 29. Twenty-four days later, June 22, we saw 15 birds in a single group. Some of these appeared to be full-sized young. As the plovers gather into groups, each group begins what looks like training for fall migration. During July the character of flight is gradually altered; the flutter stroke characteristic of nesting birds being replaced by the long stroke. Power and speed now characterize the plover's flight.

The flight transition is clearly visible. Thus in August most individuals were already using the long stroke, but a few were still using the flutter stroke. Some started a flight with one but changed to the other in mid-air. Fluttering birds were still solitary or in pairs, alighted on fence posts, occasionally gave the long whistle, and in general exhibited breeding behavior. Birds using the long stroke did none of these things.

During the fall migration Upland Plover populations at Faville Grove fluctuated in numbers. This is in marked contrast to the steady increase during spring migration. The fluctuations presumably arise from the arrival or departure of transient birds which stop in the fall but apparently not in the spring.

Migration from Faville Grove usually begins about August 1, and may continue as late as September 25. In southwestern Wisconsin, during 1939, the last plover of a known breeding group had migrated from its region by July 21. In central Illinois, during 1939, plovers were beginning to migrate by July 9. The last birds to leave Faville Grove were recorded for four years:

Year	Last bird seen on
1935	August 14
1936	August 10
1937	September 25
1938	September 10

Food Habits

W. L. McAtee (1912) examined 163 stomachs, finding nearly one-half the food to be grasshoppers (Locustidae), crickets (Gryllidae), and weevils (Curculioninae); 97 per cent of its food is animal matter. The vegetable food comprises the seeds of buttonweed (*Abutilon theophrasti*), foxtail grass (*Setaria* spp.) and sand spurs. The animal foods included:

Insects

Bugs (Hemiptera)
Flies (Diptera)
Moths (Lepidoptera)
Ants (Formicidae)
Other Hymenoptera
Leaf Beetles (Chrysomelidae)
Horseflies (Tabanidae)

Grasshoppers (Locustidae)
Crickets (Gryllidae)
May Beetles (Scarabaeidae)
Click Beetles (Elateridae)
Bill Bugs (Calendrinae—at least 9 species)
Weevils (Curculioninae)
Greater Clover-leaf Weevil (Curculioninae)
Lesser Clover-leaf Weevil (*Hypera nigrirostris*)
Clover-root Weevil (*Sitona hispidula*)
Cowpea Curculio (*Chalcodermus aeneus*)
Cottonboll Weevil (*Anthonomus grandis*)
Short-snouted Weevil (*Tanymecus confertus*)
Bison Snout Beetle (*Thecesternus humeralis*)
Imbricated Snout-beetle (*Epicaerus imbricatus*)
Grapevine Colaspis (*Colaspis brunnea*)
Southern Corn Leaf-beetle (*Diabrotica duodecimpunctata?*)

Insect Larvae	*Other Animal Foods*
Wireworms (Elateridae)	Snails (Pulmonata)
White Grubs (Scarabaeidae)	Spiders (Araneida)
Cutworms (Noctuidae)	
Sawfly Larvae (Tenthredinidae)	Millepeds (Diplopoda)
Cranefly Larvae(Tipulidae)	Centipeds (Chilopoda)
Horsefly Larvae(Tabanidae)	
Army Worm (*Cirphis unipuncta*)	Cattle Tick (*Margaropus annulatus*)
Cotton Worm (*Alabama argillacea*)	Earthworm (*Lumbricus terrestris*)
Cotton Cut-worm (*Anthonomus?*	

Aughey (1878) examined 22 stomachs in Nebraska, finding an average of 37 locusts and 16 other insects in each.

Howell (1907) examined 48 stomachs from Texas, finding them filled with weevils of various species.

Forbush (1912) reports the Upland Plover feeding extensively on crowberries (*Empetrum nigrum*) while in Labrador.

Bates (1907) reporting from Nebraska, says, "After the wheat is out, and during migration, it frequents the wheat stubble and gorges itself with waste grain."

Loyster helped raise four young Upland Plovers in 1934, feeding them chopped night crawlers, cracked grain, raw beef, and meal worms. When 18 days old they ate a tablespoon of this mixture every hour. He says, "Most of their time was spent in the rose bed catching bugs and worms. With the approach of the migrating period, their appetite greatly increased."

On several occasions we observed one or more plovers standing about fresh cow dung catching insects attracted to it. On April 30, 1938,

a pair was feeding in a calf pen in a farmyard under trees. Apparently the dung attracted insects so palatable to the plover as to outweigh their usual reluctance to approach trees and buildings. Cattle had not yet been turned into the pastures; hence fresh dung was not available there.

It is conceivable that there was a symbiotic relationship between buffaloes and plovers similar to that which now exists between cattle and plovers.

Plovers often feed in newly-mown hayfields, apparently attracted by insects.

During spring the Upland Plover delights in chasing insects in green fields, but as soon as the grass gets taller than the plover's back it deserts the fields.

Management

Spring shooting was especially damaging to the Upland Plover due to the bird's tameness during this season. H. L. Stoddard tells us that plovers increased in numbers on an area west of Chicago after the practice of spring shooting ceased in 1913. Prior to this date hunters kept the plover's numbers very low.

Our present generation of Wisconsin hunters has no great appetite for hunting shore birds. Some shorebirds are killed unlawfully by duck hunters, but few people pursue them for sport. The plover gains by this and by the further fact that it has gone south before the hunting seasons of other species begin.

Protection from trampling may be given to plover nests in pastures by building a fence about the nest. The plover's reluctance to desert makes it possible to do this. Low stakes or "tepees" over the nest were tried at Faville Grove, but they attracted cattle as "rubbing posts" and thus invited nest destruction.

The plover's concentrated nesting period, as well as the late maturity of the lowland hays, exempts the bird from heavy losses in hay mowing. The first peculiarity, however, sometimes induces some nest mortality during spring plowing. Loyster's success in raising young plovers from wild eggs shows that eggs from destroyed nests may be salvaged and artificially propagated.

Chronology

April 13 to 22:	First birds arrive on area. (Most of them are paired and exhibit breeding behavior.)
April 30:	Last birds reach area. (A few remain unpaired.)
May 1 to 8:	First eggs laid. (Whistling decreases and birds become difficult to see.)
May 22 to 29:	First eggs hatch. (After incubating 21 days.)
May 29 to June 6:	Most frequent hatching dates.

June 21 to 28: Last eggs hatch, probably re-nestings or late pairings. (Entire nesting spread over only two months. Average nest mortality of 34 per cent is half the rate common in other upland game birds.)

June 22 to 30: First mature-appearing young noted in groups with adults. (Have reached full size in 30 days, which is less than half the growth period of gallinaceous game birds.)

July 1 to 20: Birds preparing for migration. (Flutter stroke replaced by long wing stroke, long whistle by short whistle, tameness by wariness, and pairs by groups.)

July 21 to 31: First birds leave area. (Local population begins fluctuating due to arrival of transient birds from farther north.)

August 10 to September 25: Last birds leave area.

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PARASITISM OF THE ENGLISH SPARROW ON THE NORTHERN CLIFF SWALLOW

BY DAYTON STONER

THAT the English Sparrow (*Passer domesticus*) frequently inflicts its presence on many of our native bird species is well known. Throughout the breadth of the United States its association with the Northern Cliff Swallow (*Petrochelidon a. albifrons*) during the nesting season of the latter has been responsible in some measure, I think, for the Cliff Swallow's vagaries of local appearance and disappearance.

In the Albany, New York, region I have observed for several seasons situations paralleling those reported by Barrows (*U. S. Dept. Agric. Bull.*, 1, 1889), Burleigh in Washington State (*Auk*, 47, 1930: 48) and by other writers in which Cliff Swallows nesting under the eaves of buildings were dispossessed of their domiciles by English Sparrows. Tufts of grass and feathers projecting from the entrance usually mark the sparrow-inhabited Cliff Swallow nests. Not only do the English Sparrows lay their eggs and rear their young in these usurped domiciles but, in one instance that came under my observation, a pair of sparrows temporarily confiscated the domicile and later either left it voluntarily or was driven away by the Cliff Swallows originally inhabiting it, but not until at least one sparrow egg had been deposited in the nest.

The group of Cliff Swallow domiciles in question was located on the east side of a barn, long since painted red, about 15 miles southwest of Albany, New York. When I first visited this nesting on June 2, 1937, it comprised 52 domiciles of which 40 contained one or more eggs. Two of the domiciles contained only eggs of the English Sparrow while in one domicile ("No. 3"), reposed three Cliff Swallow eggs and one sparrow egg.

On June 11 the three swallow eggs in domicile No. 3 were still under incubation but the sparrow egg had hatched about two days earlier and the nestling appeared to be in good condition. On June 14 the swallow eggs were still unhatched while the flourishing young sparrow weighed 13.1 grams and its outer primary was 1.0 mm. in length. Evidently it was attended only by the adult Cliff Swallows. Immediately following my removal of the nestling sparrow the solicitous swallows began repairing the slight damage I had inflicted to the mud shell in this operation.

On June 16 the domicile contained one unhatched swallow egg, one dead swallow age 1 to 2 days, one live nestling swallow age 3 to 4 hours (weight 1.5 grams), and the nestling English Sparrow which weighed 12.0 grams; length of outer primary 4.0 mm. As before, the adult Cliff Swallows began to repair the mud shell while I was still weighing and measuring the young birds.

On June 18 the domicile contained only a newly hatched Cliff Swallow (weight 1.2 grams) and the well-fed nestling English Sparrow weighing 19.3 grams; outer primary 9.0 mm. in length. The adult swallows began to effect repairs on the domicile before we concluded examination of the nestlings.

Three days later, June 21, the completely repaired domicile held only the well-grown English Sparrow weighing 26.0 grams and bearing outer primaries 22.0 mm. in length. Upon completing measurements and returning this bird to the nest, Mrs. Stoner observed two *different* adult Cliff Swallows carry food to the young sparrow. One adult remained in the domicile for a time, then left with a pellet of excrement which it dropped after flying a short distance.

That the nestling English Sparrow had fared well through the ministrations of its energetic but misguided foster parents was attested on June 23, when it weighed 24.8 grams and the outer primary measured 29.0 mm. in length. The domicile, too, had been completely repaired by the Cliff Swallows.

Our last observation on the young sparrow occurred on June 25 when it was about 16 days old and weighed 23.0 grams. The total length of the outer primary was 34.0 mm., of which 12.0 mm. remained enclosed in the feather sheath.

It occurs to me that the circumstance here reported for one pair of English Sparrows may be, perhaps, more widely prevalent and that possibly this introduced and rather undesirable bird may be tending to develop parasitic breeding habits. Supplementary observations to supply further evidence are highly desirable.

NEW YORK STATE MUSEUM, ALBANY, NEW YORK.

FOOD HABITS OF THE HERRING GULL IN RELATION TO FRESH-WATER GAME FISHES IN MAINE[1]

BY HOWARD L. MENDALL

THIS discussion of the summer food of the Herring Gull (*Larus argentatus*) is based on the analyses of the stomach contents of 62 birds from the inland waters of Maine. Special attention has been paid to the relationship between the gull and the game fishes of the State. The collecting of specimens was supplemented by field studies on the feeding habits of the birds, their populations, and the abundance of available food. The stomach analyses and tabulations were largely made by the writer. G. P. Cooper, Ichthyologist in the Zoology Department, University of Maine, assisted in identifying fish material and staff members in the Zoology and Botany Departments helped in the identification of other food items. Tabulation was of dry material and was made according to the percentage-by-bulk method as recommended by the Bureau of Biological Survey. In addition to the stomachs, a few pellets of regurgitated food were obtained from Moosehead Lake. The results obtained by analyzing these are discussed in the report but are not tabulated, as the pellets were taken chiefly from one locality and were a selective collection; consequently, although having a certain degree of interest, they do not represent typical cases.

Of the 62 stomachs collected, 12 were empty or unfit for percentage tabulation. A summary of the food items in the remaining 50 is given in Table 1.

TABLE 1. FOOD OF HERRING GULLS FROM INLAND LAKES, MAINE, JUNE–SEPTEMBER 1936–1937

	Percentage of total	Percentage of total
FISH		76.90
White Perch (*Morone americana*)	36.08	
Sunfishes (*Eupomotis gibbosus* and *Lepomis auritus*)	10.10	
Yellow Perch (*Perca flavescens*)	8.18	
Minnows (Cyprinidae)	6.14	
Small-mouthed Bass (*Micropterus dolomieu*)	4.00	
Common Sucker (*Catostomus commersonii*)	3.60	
Trout or Salmon (Salmonidae)	2.00	
Unidentified fish	6.80	
MISCELLANEOUS ANIMAL FOOD		6.86
Insects (chiefly Hymenoptera and Coleoptera)	3.44	
Mollusks (Unionidae)	2.06	
Birds (Compsothlypidae and Fringillidae)	1.36	
VEGETABLE FOOD		8.04
Miscellaneous vegetation (Algae, *Carex*, Graminae)	4.64	
Blueberries	3.40	
REFUSE (garbage and carrion)	8.20	8.20
	100.00	100.00

[1] This study was conducted by the Maine Cooperative Wildlife Research Unit, under the direction of C. M. Aldous, U. S. Biological Survey, leader, the University of Maine, the Maine Commission of Inland Fisheries and Game, and the American Wildlife Institute, cooperating.

From the foregoing Table it would seem that the sport fisherman has little to fear from the food habits of the Herring Gull. Maine's important game fishes—trout and salmon—occurred in only one stomach and represented only 2 per cent of the total stomach contents examined.

This certainly does not warrant any bitter condemnation of the Herring Gull and could not, even to the most avid fisherman, justify a program of its control. Moreover, the habit of trout and salmon of remaining in the deeper water of lakes during most of the summer render it extremely difficult for gulls to obtain them in any numbers even when other food is so scarce as to necessitate a deliberate search for these fishes.

Thirty-six per cent of the total food of the birds examined was found to be white perch. This is a common species throughout Maine, particularly in the southern half of the State. Although a favorite of some anglers in waters not populated with trout and salmon, its numbers are great enough so that there is little danger of the gulls depleting the supply. In fact, unpublished data from growth studies made by G. P. Cooper indicate that the perch population in many Maine lakes is far too high; such overpopulation results in stunted fish. Also, white perch are probably an important factor in causing the gradual disappearance of trout and salmon from many lakes in southern Maine. Thus the gull might be benefiting trout fishermen by reducing the numbers of perch.

The second most important food from the gulls' standpoint is sunfish, represented by two species. Sunfish made up slightly more than 10 per cent of all food eaten. These fish are worthless from the standpoint of the anglers in this State at the present time.

Yellow perch, a fairly common fish in most Maine waters, constituted about 8 per cent of the food material examined. Although a few people eat this species, it is regarded as a nuisance by most sportsmen.

Various minnows—largely fallfish or chub (*Leucosomus corporalis*), with a few golden shiners (*Notemigonus crysoleucas*) and common shiners (*Notropis cornutus*)—formed about 6 per cent of the food. These fishes are very common and are valueless except as food for other fishes and as bait. Fallfish were the second most important food represented in the series of pellets collected at Moosehead Lake; since the size of the bones indicated fish of a length up to 15 inches, it seems probable that they had been taken as dead or dying fish. Various field observations I have made indicate that gulls seldom capture living fish exceeding 6 or 7 inches in length.

Black bass appeared to make up 4 per cent of the total food. With one exception, no whole fish of this species greater than 5 inches long was found in any stomach—yet some of the bones and fragmentary remains showed that much larger ones were sometimes eaten. One 9-inch

bass was obtained from a stomach, but the badly decomposed and bloated condition indicated beyond doubt that it had been dead at least two days when eaten by the gull. I believe that the other large bass eaten had been taken under similar conditions. The legal minimum length of bass that may be caught in Maine is 10 inches. It is a familiar fact that many smaller ones are caught—some just short of the legal size—and released; it is also well known that some such fish die and thus become available to the gulls which are probably incapable of catching and killing large, healthy bass. Dead bass are often seen floating on these waters or washed up on shore. I have seen a gull carrying away such a fish, and from the laborious way in which the bird flew—to say nothing of the bloated appearance of the fish—felt that it would be impossible for the gull to have captured it alive.

The common sucker composed 3.6 per cent of the food of the Herring Gull as shown by the stomach analyses, although the pellet examination indicated more remains of sucker than of any other species. Suckers are very abundant in most lakes in Maine; therefore predation by gulls could not be considered a serious liability to sport fishing even in lakes where the small suckers are important food for game fishes. In lakes in which suckers are so abundant as to compete seriously with game fishes for food, predation by gulls on suckers might be an asset to the fisherman. As was the case with bass and minnows, many of the suckers taken were large, 8 to 12 inches long, and consequently the gulls probably had not taken them alive.

Miscellaneous animal food composed 7 per cent of the entire stomach contents. Insects, chiefly ants and beetles, and fresh-water mussels were frequently found. The eating of birds, mainly warblers and sparrows, may or may not indicate predation, since it is usually difficult to determine from stomach analyses the means by which food is obtained. Remains of four birds were also found among the pellets collected at Moosehead Lake. My field observations on coastal breeding islands have shown that dead birds are often eaten by gulls but sometimes healthy, living birds are also captured. In any case, the taking of living birds by gulls is not frequent enough to be serious. It is interesting to note that among the regurgitated material collected was the entire carcass of a red squirrel (*Sciurus hudsonicus*).

Vegetable food constituted about 8 per cent of the total contents. The blueberries taken were probably all wild fruit. The remainder of the vegetable food consisted chiefly of algae and seeds of grasses and sedges.

Animal and vegetable material believed to be garbage or carrion made up 8.2 per cent of the food. This consisted chiefly of meat scraps, vegetable peelings, decayed fish refuse, and similar material. The Herring Gull is well known to be a scavenger and it hardly seems necessary to point out its value, particularly at lakes having a large number

of cottages and resort areas. Dead fish and table scraps provide easy meals for the watchful gulls. As a result, the resort lakes in Maine that are frequented by gulls are usually comparatively free from such refuse.

In considering the economic status of the Herring Gull, it should be borne in mind that population densities are often a major factor in determining the beneficial or detrimental qualities of a species. On the coast of Maine, for example, my studies have indicated an abnormally high gull population, with a certain amount of ensuing damage to some of man's interests, but this situation most certainly does not exist at present in inland waters.

Summary

From the results of this study, it does not seem that the presence of Herring Gulls at the inland lakes of Maine need cause any alarm to fishermen. Most of the fishes taken by gulls are either species that are very abundant or else those having comparatively little value; predations on the abundant species cannot be considered as detrimental to sport fishing. The favorite game fishes, trout and salmon, were found to constitute one of the smallest items in the gulls' diet. Herring Gulls are not as yet very plentiful at any locality within the interior of the State except at Moosehead Lake, and unless a large population of the inland birds occurs in the future, it would seem unwise to practice any control. The taking of weak, dying, or dead fishes is probably of distinct benefit as a disease-control measure on behalf of the fish population. The general scavenger qualities of the gull are very commendable, especially in the summer resort areas. Fishermen and summer residents of Maine's lakes should not overlook the fact that, from the food-habits data at hand, the Herring Gull, in its present numbers, is an asset and not a liability.

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SEXUAL PHOTOPERIODICITY IN THE BLUE JAY (*CYANOCITTA CRISTATA*)[1]

BY THOMAS HUME BISSONNETTE

STUDIES too numerous to cite here in full have shown that many, but not all birds, are sexually photoperiodic, and that some respond to factors other than light or in addition to it. Some may be controlled by an inherent rhythm accelerated or retarded by changes in environmental factors or independent of them. Not all sexually photoperiodic birds respond in the same way to changing length of day (Benoit, 1935–7; Bissonnette, 1936, 1938, 1939; Marshall, 1936, 1937; Ringoen and Kirschbaum, 1939; Rowan, 1938a, b; Witschi, 1935). It is, therefore, necessary to know how each species reacts in this regard, both in general and in detail, to gain a full and accurate picture of the phenomena of sexual photoperiodicity. In this study the Blue Jay (*Cyanocitta cristata*) has been tested for response by sexual activation to increasing periods of exposure to light in winter.

Material and Method

Blue Jays of both sexes were subjected to night-lighting from a 60-watt bulb for 6 hours each night, after normal daylight, in an unheated basement room, from December 3 to 31. They were fed mixed grains and ground-up table scraps, the food used to trap them, with some "fox food" added. They were sacrificed for study on the latter date.

Control females were shot from the wild on January 7; males on March 16, two within ten minutes of each other, to check on uniformity of testicular stages under normal "wild" conditions and for comparison with the experimental birds. Judged by intestinal contents, these controls ate food like that given the lighted birds. Their total daylight time and intensity were somewhat greater than those of experimentals in the basement. This has been correlated, in Starlings (*Sturnus vulgaris*), with a slightly more advanced degree of sexual activity than that of "inside controls." The stages of these birds may be expected to differ slightly less from the experimentals than would controls on normal daylight in the basement.

Testes, epididymides, ovaries and oviducts were sectioned from paraffin at 10μ after Bouin's fixation and stained in iron-hermatoxylin with and without eosin. Representative sections of all were photomicrographed at comparable magnifications for exact comparison to supplement microscopical study, as shown in legends to the figures.

Observations

Males

Testes. Testes of controls (Figs. 1, 2), killed on March 16, exhibited two different states in the two birds killed within ten minutes of

[1] Aided by a grant from the Penrose Fund of the American Philosophical Society, 1938-9.

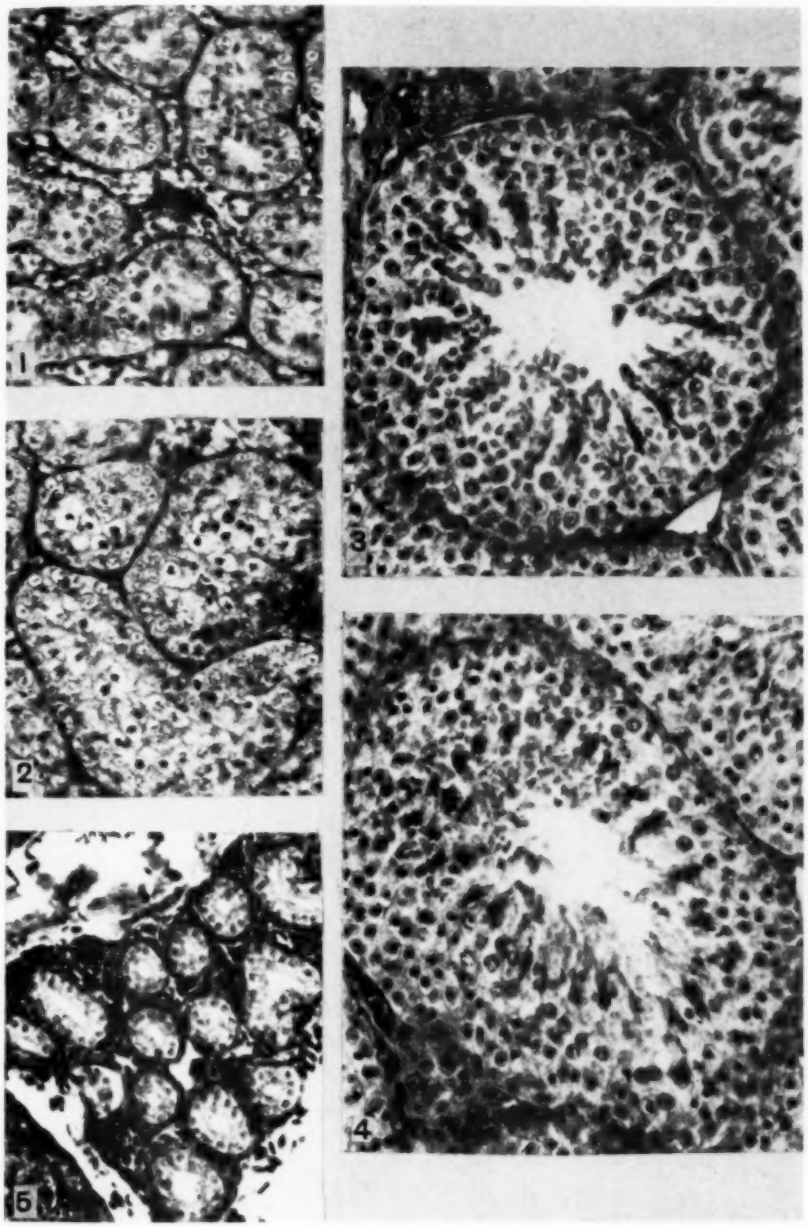
each other and others in different birds. In one (fig. 1), marked increase in size, elongation, and activity of Sertoli cells and mitoses of spermatogonia were beginning to occur; but no synizesis was reached in any regions of the gonads. Interstitials were behaving as they do in Starlings at comparable dates, *i.e.*, becoming flattened and reduced in apparent size. In the other (fig. 2), similar elongation of Sertoli cells and multiplication of spermatogonia were accompanied by synizesis stages and marked segregation of cytoplasm to individual nuclei in many, but not all, tubules of the testes. It is probable that the first bird was a juvenile and the second a mature bird in the previous year, although no external differences could be distinguished to indicate this. Their stages of activation represent ones about one to two weeks apart on the spermatogenic cycle.

Testes of lighted birds killed on December 31 (figs. 3, 4) at 28 days of lighting had reached almost, if not quite, complete spermatogenesis with all stages of germ cells including sperms with tails and spirally twisted heads. Though it cannot be stated with certainty whether these have reached their climax of activity or not, it seems improbable. Interstitial cells were flattened and their cytoplasm did not appear to be active. They resembled those of Starlings at similar stages (Bissonnette, 1930–32).

In both controls and experimentals a few scattered aggregates of pigment were to be seen in widely separated interstitial regions, so small in amount as to leave the gonad white in appearance. It is noteworthy that the testes of Blue Jays, although smaller in size both relatively and actually than those of Starlings at comparable stages on the cycle, have larger cells and nuclei. They would, therefore, produce much fewer germ cells of all stages in their testes than do Starlings at given states of activation. Testicular tubules of these lighted birds were smaller in diameter than those of Starlings at or nearing complete spermatogenesis.

Epididymides. "Control" epididymides of March 16 (figs. 5, 6) differed but little from each other in stage of activation. Cubical or low columnar epithelium without ciliary processes lined both. Neither cellular debris nor germ cells were found in their lumina. Their staining reactions suggest the mere beginnings of activation.

"Experimental" epididymides of December 31 (figs. 7, 8), on the contrary, had greatly enlarged tubules gorged with cellular debris and germ cells from primary spermatocytes to almost, if not completely, metamorphosed sperms. Columnar epithelial lining, little if any taller than in controls, appears to have ciliary processes considerably shorter than in mammals at similar stage of activity. Pressure of contents apparently flattens the columnar lining as it does in mammals when tension is high.



Figs. 1 and 2. Testis tubules from "outside" or "wild" controls, killed March 16 at 9:05 and 9:13 A.M. Note difference in stages of spermatogenesis. (x 276, approximately).

Figs. 3 and 4. Testis tubules from males lighted experimentally six hours each night, Dec. 3 to 31. Note the fairly close correspondence of stages, almost complete activation, and fairly large germ cells and nuclei. (x 276, approximately).

Fig. 5. Epididymides from "control" bird supplying fig. 1. (x 276, approximately).

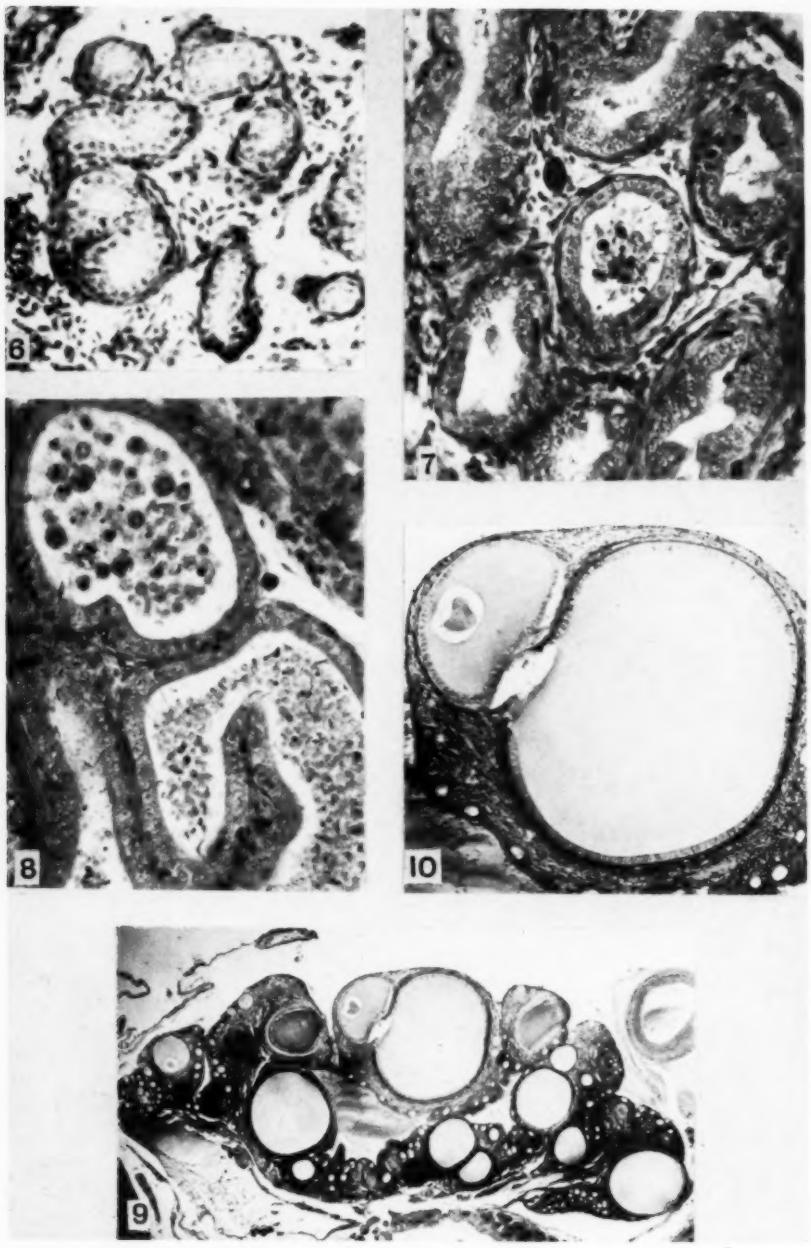
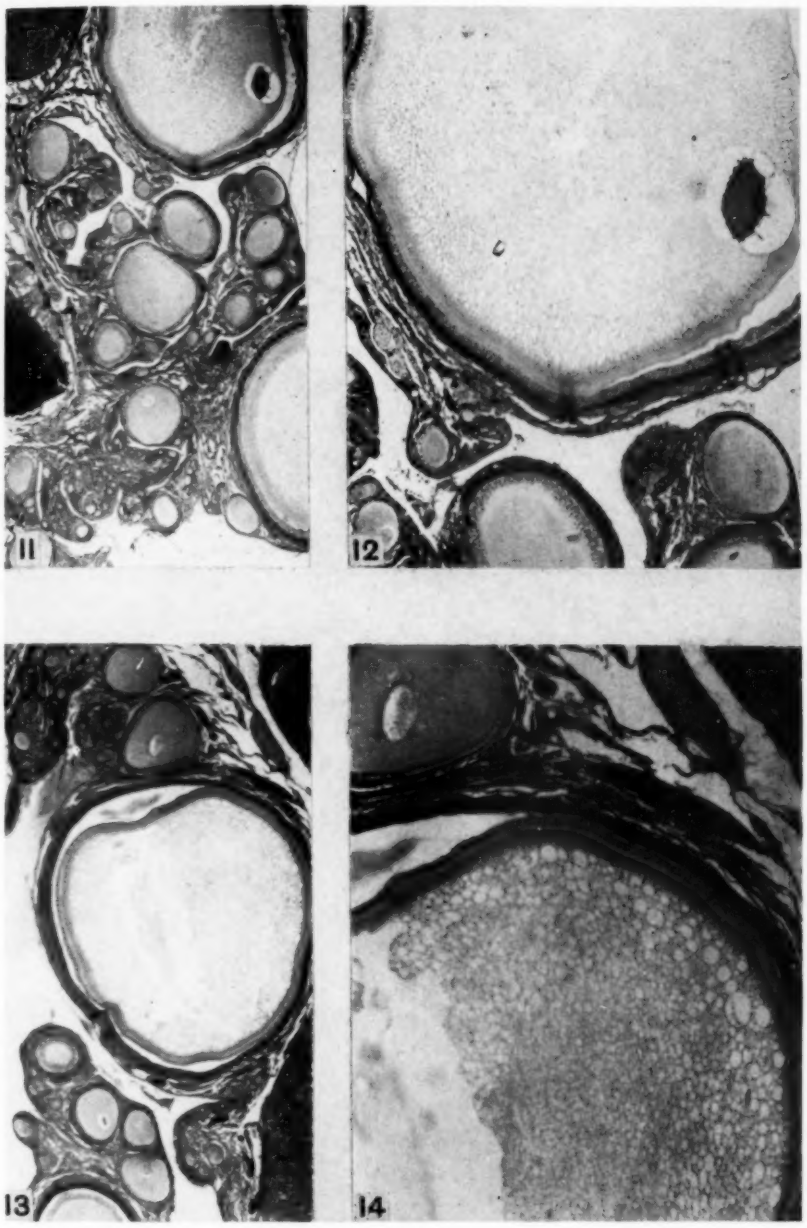


Fig. 6. Epididymides from "control" bird supplying fig. 2. (x 276, approximately).

Figs. 7 and 8. Epididymides from "experimental" birds supplying figs. 3 and 4. (x 276, approximately).

Figs. 9 and 10. Sections from ovary of "control" bird, Jan. 7. (x 28 and 69 approximately, respectively).



Figs. 11 and 12. Sections from ovary of "experimental" female, Dec. 31, after 28 days lighting. (x 28 and 69 approximately, respectively).

Figs. 13 and 14. Sections from ovary of another "experimental" female, Dec. 31, after 28 days lighting. (x 28 and 69 approximately, respectively).

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Females

Ovaries. Ovaries of "wild controls" on January 7 (figs. 9, 10) exhibited many medium sized follicles, but none as yet in the later stages of growth and yolk deposition described for the cycle in Starlings (Bissonnette and Zujko, 1936). Those of lighted birds on December 31 (figs. 11, 12, 13, 14) had two or three of their largest follicles entering the later stages of growth and deposition of yolk, with diameters at least 1.33 to 2.27 times those of the largest follicles in the "control" ovaries of January 7.

Oviducts. Experimental birds exhibit moderate to very pronounced increase in diameter, convolutions and total length of oviducts over those of controls killed eight days later in the season and therefore likely to be more advanced on the cycle. They resemble those of English Sparrows described by Ringoen and Kirschbaum (1939) after night-lighting in winter. The amount of their fluid contents was also increased over that in controls and apparently distended them, suggesting increase in secretory activity of the epithelium. They are not figured here since Ringoen and Kirschbaum's figures for the sparrow are so similar.

Discussion

Activation of testes and epididymides, leading to almost complete spermatogenesis in 28 days in December as contrasted with the conditions of these same organs in controls as late as March 16 leave no doubt about sexual photoperiodicity in Blue Jays. Response is at least as quick and rapid as in Starlings. Larger size of germ cells in the smaller testes of the Blue Jay make technical treatment and microscopical study easier than with Starlings. The birds are easy to feed in captivity and their temperaments good for experimental work. Public opinion is more or less against them as it is with Starlings because Blue Jays are inclined to bully smaller song birds in towns and villages, so they make good experimental material if they can be trapped in sufficient numbers.

The presence of pigment in a few interstitial regions indicates that they differ from the Starling only quantitatively in this respect. As in the Starling, sexual activation by increased lighting or its reverse, either by reduced light or by forced exercise, is not apparently a cause of variations in the actual amount of pigment, as Rowan (1938) suggested to be a cause for its concentration with reduction of testis size in Starlings subjected to periods of forced exercise in contrast to periods of additional lighting. As Bissonnette pointed out, it is apparently only the amount of pigment relative to other testicular elements that increases, as forced exercise or reduced lighting induces reduction of these other elements. Concentration is reversed by added experimental lighting

with both Starlings and Blue Jays, so it can hardly be evidence of activation by forced exercise as Rowan seems to wish. Parallelism with the Starling in these details is apparent.

Changes in ovaries and oviducts of lighted birds as contrasted with unlighted ones parallel those described for the English Sparrow by Ringoen and Kirschbaum (1939), and by Riley and Witschi (1939) and confirmed in this laboratory by Dr. J. W. Burger (unpublished data). Starlings react in the same way (Bissonnette, Burger, unpublished data). In all these cases the ovary is less completely and uniformly activated by lighting than the testis. It is probable that courtship posturing and other reciprocal behavior are required to bring the female bird into complete synchrony of sexual activation with the male. In pigeons, at least, the sight of another bird or the image of a bird (even of itself) is needed to induce laying and, presumably, the other later stages of egg-production (Marshall, 1936; Matthews, 1939). In some birds that nest in flocks, it has been learned that the sight of a certain number, at least, of other pairs courting and nesting is required to stimulate the females to lay (Darling, 1938). It is indicated that both the lighting and these other visual stimuli modify the activities of the anterior pituitary which in turn activates the sex glands (Bissonnette, 1932b; Marshall, 1936; Matthews, 1939). It has been demonstrated that removal of the pituitary in ferrets prevents this chain of reactions to increased lighting (Hill and Parkes, 1933; Bissonnette, 1938a).

Rowan (1938a, b) has criticized our experimental results with Starlings on the basis of lack of exact uniformity of stages in the testes, even though controls also showed similar variations whether they were "inside controls" or animals killed from the wild. His own early papers, written with his materials fresh before him, frequently lamented lack of uniformity in the sex organs of his experimental birds. The two male Blue Jays, killed within ten minutes of each other on March 16, again demonstrate what we found to be true for Starlings and other birds under "normal" conditions, namely, a quite close correspondence within certain limits, but no exact uniformity, even in birds of similar ages nor in all parts of the same gonad, especially in early stages of activation. We, therefore, have not expected exact uniformity in such stages when experimentally induced. Rates of response differ with different birds of the same species and age and under the same conditions. We feel that Professor Rowan has demanded more uniformity from our materials and results than from his own or than occurs in nature, as shown again by these two male Blue Jays. He has also shifted his point of view from maintaining that increased physical exercise is the real causative factor for sexual activation by increased lighting to stating that it is merely increase of periods of wakefulness and "physiological activity," whatever the latter expression may mean in living

animals which we are accustomed to believe are undergoing physiological activity, sleeping or waking. As Riley (1937) has shown, the mitotic germ-cell activity in the testes of sparrows and perhaps other birds is greatest at night between two and four in the morning when the temperature and metabolic rates of the birds are lowest, and this can be transferred to the daylight hours by reversing the light cycle of the birds experimentally.

Summary and Conclusions

(1) The male Blue Jay is sexually photoperiodic and responds to increased illumination in December by almost, if not quite, complete spermatogenesis and activation of the epididymis to breeding condition in twenty-eight days.

(2) Females also respond, but more slowly and less completely. Oviducts increase markedly in size and activity in a majority if not all experimentally lighted females.

(3) Exact uniformity of stages of activity of germ cells was not found in males taken from the wild within ten minutes of each other in March nor in experimentally activated birds at time of killing. This is also true of females.

(4) Larger germ cells and nuclei and smaller size of testes in Blue Jays than in Starlings make them easier to treat technically and study microscopically.

(5) Blue Jays are hardy, easily kept and fed in captivity, and temperamentally good for experimental work.

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OBSERVATIONS ON THE BEHAVIOR OF A YOUNG COWBIRD

BY MARGARET MORSE NICE

ON June 12, 1939, in a small spruce on the W. K. Kellogg Bird Sanctuary at Augusta, Michigan, I found a Cowbird (*Molothrus ater*), apparently one day old, in the nest of a Chipping Sparrow (*Spizella passerina*). The nest contained three young of the host, one apparently just hatched, the others probably a day old. The next day the youngest sparrow was gone. On June 17 the nest was found tilted and empty and the three little birds were on the ground begging for food. After reinforcing the nest and ascertaining that the adults were caring for the young, I took the Cowbird out for a while, putting it in an empty nest to photograph it; in this situation it gave the "location note"—*yip*—several times.

Development of the Hand-raised Cowbird

The next day I took the seven day Cowbird into the house and put it into a Song Sparrow nest in a strawberry basket. Two days later I gave it a six day Song Sparrow (*Melospiza melodia*) for a companion. The Cowbird readily took the insects, dried ant eggs, hard-boiled eggs and bread crumbs which I fed it about once an hour. It reacted to jarring of the nest, to the approach of the caretaker, and after 24 hours to the sight of the forceps. On the whole it was a phlegmatic, inactive bird. When it was nine days old I found that it had lost nearly a gram in weight since its adoption (from 21 to 20.4 grams). I therefore returned it to its foster parents where it gained two grams in six hours. Upon finding that it still begged for food when it saw the forceps, I took it home again.

The age at which different activities were observed is shown in Table 1. The dates for six of the activities (marked with a single asterisk) are late, due partly to the lack of continuous observation and partly to the fact that the bird was not as well nourished in captivity as it would have been in the wild.

Fear, evidenced by cowering, was seen at 7, 8 and 9 days, particularly when the bird was taken out-of-doors for purposes of photography.

Wing movement, when begging, was first seen at 7 days; it was a lateral movement involving only the manus and carpus (Friedmann, 1929:276). This became more pronounced and was still strongly in evidence up to the age of 25 days when the bird died by accident. At 11 and 12 days, however, wing action was more violent and the humerus was involved; motion pictures of this activity were obtained by Dr. Miles Pirnie. I have examined 11½ feet (3.5 meters) of this film, counting the frames which show motion of the wings. In the 28 seconds covered by this piece of film, wing flapping occurred 18 times,

each spell lasting from one to 19 frames, the great majority lasting from 3 to 6 frames, the median being 4. Since 16 frames are taken each second, this means that the wings were usually moved for a fifth to a fourth of a second, then kept quiet for perhaps twice as long before being again fluttered. The Cowbird practically always used both wings simultaneously, whereas a Song Sparrow often uses only one.

TABLE 1

FIRST APPEARANCE OF SOME ACTIVITIES OF YOUNG COWBIRD

6 days	Location call.	13 days	Took one step
7 days	Shivered wings when begging.	14 days	Wiped bill
	†Cowered (7–9 days)		Pecked at insect
8 days	*Stretched wings up	15 days	Walked and ran
	*Stretched up on legs		*Scratched head
	*Stretched wing sidewise		
	Stood on tarsi	16 days	Bathed
	Stood on one foot		Yawned
	Fanned wings		Drank out of dish
9 days	*Preened	17 days	Picked up food
	†Stretched both wings down (9–10 days)	18 days	Pecked at young Song Sparrows
10 days	Left nest		
		21 days	Antagonism note
11 days	†Hopped (11–14 days)		
	Flew	22 days	Caught mealworm
	Shook self		
	†Fluttered wings when begging (11–12 days)	23 days	*Squealed
	Assumed adult sleeping posture	24 days	Pointed bill up

* These dates are somewhat late. Shaver's Cowbird "began to stretch and preen his feathers" at 6 days (1918:10). Friedmann recorded preening on the "sixth or seventh day" (1929:273). He noted scratching of the head apparently before the bird left the nest (1929:276). He says, "Fear is first observed at about the ninth or tenth day although even then it is hardly developed" (1929:278). He does not mention any "squeal." Although young Song Sparrows often scream when banded, only one of the 42 nestling Cowbirds I banded in Ohio did so; this was a nine day old bird which I had kept in the house over night.

† These four activities were of temporary duration.

At 8 days it stretched its wings in the two ways common to all carinate birds—both wings up, and one wing sidewise. Later in the day it stretched upward on its legs. Occasionally it stood on the tarsi and once on one foot, but for the most part it lay in the nest.

A temporary stage in stretching was shown at 9 and 10 days, namely, stretching of both wings down. This does not seem to have been described in the literature (Heinroth, 1930, 1938), but I have noted it in four species: in Common Redstarts (*Phoenicurus phoenicurus*)

at 12 and 13 days and a European Cuckoo (*Cuculus canorus*) at about 3 weeks when I was studying with Dr. Konrad Lorenz in Altenberg, Austria in June 1938, and also in 5 different Song Sparrows at 8 and 9 days in Massachusetts and Michigan.

Fanning of the wings was first noted at 8 days. Two days later a violent spell of fanning carried it out of the nest, but I got it to return. The next morning it hopped out and then flew 30 centimeters to the spot where I was feeding the Song Sparrows. For three days it entered either of the nests and spent considerable time in them with the Song Sparrows.

The Cowbird hopped at first. At 13 days I saw it take one step, but hopping was its mode of progression until the age of 15 days when it no longer hopped, but walked and ran. The Prairie Horned Lark (*Otocoris alpestris praticola*) hops on leaving the nest at 10 to 11 days. "Walking is not learned for several days and when first attempted is a slow waddle with legs spread widely" (Pickwell, 1931:193). Ovenbirds (*Seiurus aurocapillus*) also hop from the age of 8 to 11 days. At 10 days one brood "took steps about half of the time," while a bird of 11 days "flew, ran and hopped" (Hann 1937: 193–4).

The Heinroths (1924–32) give information on this subject in 8 passerine species that normally walk as adults. Six hop at first: Sky Lark (*Alauda arvensis*), Crested Lark (*Galerida cristata*); Savi's Warbler (*Locustella luscinioides*), Magpie (*Pica pica*), Hooded Crow (*Corvus cornix*) and Raven (*Corvus corax*). These leave the nest at the following ages in days —9, 9, 12–14, 21, 35, and 40 respectively. Two species, however, walked from the beginning: Grasshopper Warbler (*Locustella naevia*) leaving the nest at 11 days, and the Rock Sparrow (*Petronia petronia*) which left at 3 weeks. Lorenz (1937b) mentions the early hopping of Corvidae, pipits and larks as an atavistic trait.

The Cowbird was far less active than the Song Sparrows that were 3 and 4 days younger. At 11 days it flew 30 centimeters and later 130 centimeters from the table to the floor; at 15 days it flew 160 centimeters. It had not perfected landing even at 23 days.

On June 23 the Cowbird often hopped into the Song Sparrows' nest or on to the edge while they were being fed. In the latter situation the 8 and 9 day Song Sparrows begged from the Cowbird and it from them. The next day the oldest Song Sparrow left the nest; it begged from the Cowbird, pursuing it and hopping on it, while the Cowbird reciprocated by begging from the Song Sparrow.

It was first offered a bath at 16 days. It climbed into the dish and drank for the first time by dipping the beak in and raising it, although from the age of 13 days it had drunk water from my finger. It crouched down, but not enough to touch the water with its body, and went through the bathing movements above the water. It then crouched down further, bathing in proper style, using the wings simultaneously, afterwards using them alternately. It shook itself, but failed

to continue with activities which would tend to dry it. That afternoon when sprinkled with water it bathed while Dr. Pirnie took motion pictures. It did not bathe again although a pan was constantly on hand.

When the Cowbird was 17 days old and the Song Sparrows 13 and 14 we brought them to Chicago. My adult, hand-raised male Song Sparrow, Y, at once came to the cage; the Cowbird shivered its wings and called, but the young Song Sparrows gave no reaction. (They had not been fed by a bird since the age of 6 days.) As long as it lived it continued to beg with unabated zeal from the adult and young Song Sparrows whenever they approached, although it never received food from any of them. It also begged at the approach of any person.

It first started to pick up food at 17 days, but it did this very little until the age of 22 days.

At 18 days I saw the first sign of hostility on the Cowbird's part; it pecked the young Song Sparrows when they landed on its back. At 21 days it gave a "snarling" note at one of the young birds and the next day at Y (the adult Song Sparrow).

At 23 days I recorded a new note: "Cowbird flies over on top of Y's cage and begs. Y attacks, Cowbird squeals and stays. Y approaches again; Cowbird looks down and begs and begs. Cowbird then flies around the room giving another squeal. Is very awkward in comparison with the young Song Sparrows."

At 24 days after it had begged from two young Song Sparrows, it raised its head and pointed its bill at the ceiling, suggesting the behavior of adult male Cowbirds on meeting one another.

Weights

The Cowbird weighed 21 grams at 7 days, 20.5 at 11 days, 29 at 21 days and 29.8 at 23 days. These weights are much lower than those given by Friedmann (1929:263–266) where three birds ranged from 24 to 31 grams at 7 days, one reaching 33 grams at 9 days. Pickwell's bird weighed only 16.8 grams at 7 days, Herrick's (1935:71) two individuals weighed 21.4 and 23.4 grams at 7 days, the latter reaching 30.8 at 10 days. Five Cowbirds weighed by Hann averaged 24.8 at 7 days, and averaged 26.6 at leaving the nest. At Columbus, Ohio, the following weights were recorded: 27.2 grams at 6 days; 23.3, 24.5 and 26 grams at 7 days; 24.5 and 31 grams at 8 days; 17 grams at 9 days; and 29.7 and 31.5 at 10 days (Nice, 1937:223).

A number of factors probably play a part in these differences in weight. "Parental" care would seem to be the most important. Size of the egg has an influence, at any rate in the early days. I found fresh eggs ranged in weight from 2.7 to 4 grams. Still another possible factor is sex. Adult females at Columbus averaged only 76 per cent as heavy as adult males (Nice, 1938); it may well be that a differential growth rate operates even with nestlings. This is true with some hawks.

Instinctive and Learned Behavior

The activities listed in the Table are instinctive actions. They are not modified in form by learning or experience. Some appeared later with my bird than under natural conditions because of its retardation in growth due to artificial feeding.

From the age of 7 to 11 days the Cowbird's environment differed from natural conditions chiefly in the change of parent Kumpan (Lorenz, 1935, 1937a) from a bird to a human being; yet its stay of six hours at the age of 9 days with its foster parents must not be forgotten. After it left the nest, its environment consisted largely of a cage, a table, dishes for food and water, and household furniture; instead of being alone and being fed by Chipping Sparrows, it had the company of Song Sparrows a few days younger and was fed by people. In this situation it reacted to Song Sparrows aged 8 to 21 days and an adult, and also to human beings, as its parent Kumpans. The sight of an approaching bird released its begging reactions and constant frustrations from the age of 12 to 24 days seemingly had no influence towards inhibiting this response. The reaction to persons was learned. The stay with the foster parents when 9 days old may have had something to do with the persistence of the innate perceptual pattern (Craig, 1938) of a bird as the parent Kumpan; this might have been the opportune time for imprinting (*Prägung*) (Lorenz, 1935, 1937a).

We once tried to capture a Cowbird about three weeks old that was being fed by Wood Pewees (*Myiochanes virens*) but it would not allow us to approach nearer than 5 meters.

It has often been observed that the nestling Cowbird does not react to the alarm notes of its foster parents (Friedmann, 1929: 273; Hudson, 1920, I:84 with *M. bonarensis*); how then does the somewhat older bird learn to fear human beings? Three possibilities suggest themselves. Fear might be suggested to the young bird by the action (precipitate flight) of the foster parent. Or an understanding of the alarm note of the foster parent might come to the young bird at some time between leaving the nest and independence—a matter of maturation; it is common knowledge that adult birds understand the alarm cries of many other species. Or it might simply be that any large moving object is feared until proved harmless. It would be interesting to know how Cowbirds are attracted to cows. Is it a matter of tradition, the young following adult example? Friedmann (1929:279) mentions a flock of about 300 Cowbirds on August 22 in the "Buffalo Enclosure" at the New York Zoological Park. "There was not a single adult bird in the flock, all being young birds in the process of molting."

Does the Young Cowbird Show any Adaptation to Nest-Parasitism?

The Cowbird's egg does not show adaptation to parasitism. It is

normal in size instead of reduced as is the European Cuckoo's. Its incubation period—11 to 12 days with the Ovenbird (Hann) and Song Sparrow (Nice, 1937) as hosts—corresponds with that of its relative the Red-winged Blackbird (*Agelaius phoeniceus*). Despite the reiterated statement that the incubation period is only ten days, I have yet to see a definite instance of an incubation period of the Cowbird shorter than eleven days.

It has been said that, "The young Cowbird usually tries to trample on the other young in the nest." (Friedmann, 1929:276.) I have never found this to be true, either in my extended experience in Ohio with the Cowbird as parasite of the Song Sparrow, or in the intensive observation on this hand-reared bird. Hostility—and then only to a slight degree—first appeared at 18 days, one day later than I have noted it in the Song Sparrows.

Unlike the young European Cuckoo, the young Cowbird has no instinct to evict the other occupants of the nest. I have always found it a peaceable occupant of the nest. Its large size, however, may bring death to some or all of its nest-mates, either by crushing or starvation. The near-disaster mentioned in the first paragraph was presumably due to the activity of the Cowbird in an unusually frail nest.

The only respect in which my young Cowbird seemed adapted for a parasitic life was its persistent begging from every Song Sparrow old or young. We do not know, however, how much this was conditioned by the individual experience of this bird, nor how persistently, for instance, a Song Sparrow under like circumstances would beg from other birds. We need many more experiments before we can say whether or not the young Cowbird shows any adaptation for a parasitic life.

Summary

A Cowbird was kept in the house from the age of 7 to 25 days, and the first appearance of different instinctive actions noted.

Weights of nestling Cowbirds are given from five sources and the question raised as to the possiblity of a sex difference in size during nest life.

The matter of instinctive and learned behavior is discussed.

The eggs of the Cowbird show no adaptation for parasitism.

There appears to be no conclusive evidence that the young Cowbird shows any such adaptation.

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5708 KENWOOD AVENUE, CHICAGO, ILLINOIS

GENERAL NOTES

Deformation in Nestling Cormorants.—While assisting Dr. Harrison F. Lewis band the young in a large colony of mixed cormorants on Lake Island near Cape Whittle on the north shore of the Gulf of St. Lawrence, July 13, 1939 I encountered two unusual conditions in the nestlings.

One of the young Double-crested Cormorants (*Phalacrocorax auritus auritus*), having a wing measurement of 92 millimeters, was found totally blind. There was a fleshy growth over both eyes. It had caused a slight swelling of the eye lids but had not affected the eye balls.

A young European Cormorant (*Phalacrocorax carbo carbo*), with a wing measurement of 220 millimeters, was discovered with one wing twisted backward in such a way that it could not be outstretched or used in any way. The bones were growing around each other in a curved fashion indicating that the accident must have occurred when the bird was quite young. It no doubt resulted from the vigorous shuffling and fighting for position that takes place during feeding.

Since both birds were doomed to an early death when they would be deserted by their parents at the end of the nesting season, they were retained as specimens for the Dartmouth College Museum.—Richard Lee Weaver, *Dartmouth College, Hanover, New Hampshire.*

American Egrets Breed in Wisconsin.—Three American Egrets (*Casmerodius albus egretta*) came to my attention on June 6, 1939, while I was visiting the Trempealeau bottoms in Wisconsin, in company with Ray C. Steele, Superintendent of the Upper Mississippi Wildlife and Fish Refuge. Steele said that these birds had been noted flying about a nesting colony of Great Blue and Black-crowned Night Herons and Double-crested Cormorants and gave every indication that they might also be breeding.

We looked the colony over but did not see the egrets go to any nest. Steele reported, however, that three nests had been definitely located and later reported that all three pairs of birds were successful in rearing young. The files of the Biological Survey indicate that this is the first known nesting of this species in Wisconsin since those reported near Jefferson in July 1863 and Two Rivers in June 1880 (Kumlien and Hollister, "Birds of Wisconsin," *Bull. Wis. Nat. Hist. Soc.*, 3, 1903).

The American Egrets, which have been gradually recovering in numbers in recent years and slowly extending their range, now are familiar sights in localities from which they had long been absent. Steele has reported stragglers in increasing numbers in recent years, and in view of my interest in the birds at the time of my visit, suggested that I publish the record. I cannot do better than to quote from his summarized record of their appearances in this general vicinity prior to this successful breeding attempt:

"On May 20, 1936, near Marshland, Buffalo County, Wisconsin, a pair of adult egrets were observed, this being the first sight record in this locality. The writer did not again observe the birds during the season of 1936, nor were they sighted by other personnel employed on the Upper Mississippi Refuge. No observation of them was recorded during 1937.

On July 20, 1938, five adult American Egrets were observed near Brownsville, Houston County, Minnesota, and a report was recorded of 'white geese' having been observed in this locality on July 9. Undoubtedly the birds observed were egrets. On July 25, 1938, near the village of Potosi, Grant County, Wisconsin, eight American Egrets were observed, and as the season advanced it was not uncommon to see flocks of as many as 25 birds throughout the 284-mile length

of the Upper Mississippi River Wildlife and Fish Refuge. They continued in evidence as far north as Buffalo County, Wisconsin, until October 8, the last date of observation recorded during 1938.

On April 26, 1939, a pair of American Egrets were observed at the Trempealeau Migratory Waterfowl Refuge in Trempealeau County, Wisconsin. On May 10, 1939, 15 birds were observed near DeSoto, Crawford County, Wisconsin. On May 27, four adult birds were observed feeding in a marsh at the Trempealeau Migratory Waterfowl Refuge near a known nesting colony of Double-crested Cormorants and Great Blue and Black-crowned Night Herons. Observation disclosed that the egrets were traveling from the feeding grounds and alighting in trees among the other nesting herons and cormorants. On June 8, 1939, three egret nests were located in the heron and cormorant rookery. The nests were situated about 35 feet from the water in birch trees, the bases of which were inundated, but the trees had not yet been killed. On June 30 both still and motion pictures were made of the nesting egrets, one of the three nests containing five young birds, one containing four, and the third containing four birds and one unincubated egg. On July 16 a blind was constructed from which a more complete and better series of still and motion pictures were made. On July 31 the young birds had left the nest and were observed feeding on the nearby marshes.

The young birds evidenced little disturbance while being photographed without a blind; however, the adult birds would not come to the nest to feed the young while I was in a nearby tree but after the blind was constructed within 20 feet of the nearest nest the adult birds made frequent visits to the nests and fed the young. The slightest disturbance or noise in the blind would frighten the adults away. Several hours were spent in the blind photographing and observing these birds."—Ira N. Gabrielson, *U.S. Biological Survey, Washington, D.C.*

The Food of Young Marsh Hawks.—Since 1935 the Game Management Section of the Illinois Natural History Survey has been giving considerable attention to the status of the Prairie Chicken (*Tympanuchus cupido americanus*) in Illinois. While making a detailed study of a four square mile area of marginal prairie farmland near Hunt City, Illinois in the summer of 1936, I found the nest of a Marsh Hawk (*Circus hudsonius*). Since the area was known to harbor a population of 150-200 Prairie Chickens and more than 200 Bob-white (*Colinus virginianus*), the opportunity seemed favorable for making observations on the predator relations of this much discussed raptor to the young Prairie Chicken and Bob-white of the area.

In order to study the food habits of this family of hawks, a wire enclosure was built near the nest and the young hawks placed inside. As soon as a hawk was old enough to fly, one wing was pinioned with a leather thong. We hoped that the adult hawks would continue to bring them food and thus furnish much desired information as to the type of food that was taken from an area well populated with Prairie Chickens and Bob-white.

Although observations were made every day or two from July 10 to August 3, we were disappointed in the amount of food brought in during that time. The artificial situation created by confining the young hawks within the wire enclosure, and the prolonged dependence of the young birds may have occasioned an atypical response on the part of the parent birds. A number of times the young seemed not to have been fed from one morning till the next and occasionally seemed to lack for two or three days at a time.

During the period of observation, young (unidentified) song birds, immature rabbits and meadow mice (*Microtus*) constituted the major portion of the bill-of-fare for the young raptors. Recognizable bird remains included three young Bob-white and two young Upland Plovers (*Bartramia longicauda*). As far as could

be determined from feathers, pellets, and other fragments, no Prairie Chickens were brought into the young during the observation period.

Although the wire enclosure method of observing the hawk family was not as successful as we anticipated, the information realized seemed to indicate that Marsh Hawks are not an important factor in the survival of upland game birds on this area.—W. Henry Leigh, *Wright Junior College, Chicago, Illinois.*

Remnant Numbers of Prairie Chicken in Southeastern Minnesota.—The dependence of Prairie Chicken (*Tympanuchus cupido americanus*) on large undisturbed breeding grounds for their continued existence is remarkably illustrated in the vicinity of Spring Valley in southeastern Minnesota. The area immediately west and south of this village is part of the original prairie and in early days was the natural habitat of the Sharp-tailed Grouse (*Pedioecetes phasianellus campestris*). With the settlement by the white men, and the resultant increase in grain fields, the Sharp-tailed Grouse receded to the west and north and the Prairie Chicken came in from the southern range. The large areas of open wet grassland, interspersed with corn and grain on the upland, apparently provided an excellent habitat for Prairie Chicken and they increased greatly until shortly after 1900. The early 20th century sportsman enjoyed an all year season and a "wagon-box limit" on the species. Hunters often shot from blinds on the booming grounds during the spring season. The birds were easy targets as they flew in from the surrounding area. Local farmers report that since about 1910 the birds have gradually decreased in numbers as the result of more intensive cultivation, drainage, and hunting. The resident birds are at present confined to a few areas which have escaped drainage and cultivation and remain in a semi-prairie type. In the office of the Soil Conservation Service at Spring Valley, Minnesota, is an aerial photograph of the headwaters of Deer and Bear Creeks. An observer, even though not familiar with this vicinity, could readily point out on the basis of cultivation the areas on which the Prairie Chicken has been reported during the last three years.

The area southeast and southwest of Spring Valley, is unlike most of southeastern Minnesota and probably contains the only permanent resident flocks of Prairie Chickens in this section of the State. During the spring of 1936, the writer and Peder N. Lund located two booming grounds in Section 12, Township 101 N, Range 13 W. Several visits were made to these grounds and 12 to 16 birds were present on each field and were conspicuous by their general inactivity. Dancing and booming were interrupted with long periods of silence. Birds were heard occasionally in the immediate vicinity but no other booming grounds were located. One bird was observed to alight and boom near the junction of two roads a mile south, indicating the occasional promiscuous booming which was often heard at random locations nearby.

The booming grounds above mentioned were plowed in the fall of 1936 and in the spring of 1937 the Prairie Chickens abandoned the area, moving to a point one mile south in Section 13, Township 101 N, Range 13 W. They occupied a grassy knoll 100 yards north of a marshy pond. On May 7, 1937 (when *Caltha palustris* and *Populus tremuloides* were in flower) 12 birds were seen in an excellent display from 5:00 A.M. to 6:15 A.M. when a light rain seemed to stop further activity. Several visits to this vicinity in the spring of 1937, 1938 and 1939 to locate other booming grounds proved fruitless and it is rather doubtful whether other grounds were being used. On October 15 and 16, 7 and 17 birds respectively, were observed from a cornfield one quarter mile east of the booming ground in Section 13. Farmers report the presence of Prairie Chickens throughout the winter, at which time their cruising radius is extended to cornfields several miles distant from the meadows where they return each night. The last visit to these grounds was made on April 30, 1939 from 5:00 A.M. to 6:30 A.M. Eight or

ten birds were observed but were generally inactive. The morning was calm, clear and warm and early enough in the season for a more active booming display.

Reports have been received of a resident flock of Prairie Chickens 4 miles north and 1 mile west of LeRoy, Minnesota. These birds were reported booming in this area in the spring of 1939. Another resident flock has been reported in an undrained area 2 miles south and 1 mile east of Grand Meadow, Minnesota. Although several visits were made to the areas by the writer, the reports have not been verified by actual observations.

Analysis of available information indicate that the Prairie Chicken in southeastern Minnesota is slowly declining in numbers and that their existence is largely dependent on the maintenance of large undisturbed breeding grounds in the undrained prairie lands. It is doubtful whether the Prairie Chicken have even maintained their populations during the past three years. A shift in farming from cultivated crops to grass crops may retard this decline.

General observations on these Prairie Chicken while booming, flushing or cruising indicate the birds are unusually timid, probably the result of direct disturbance or the harmful changes in their environment by man. The flushing distance was usually more than 100 yards and the flight limit beyond the human vision.—URBAN C. NELSON, *Soil Conservation Service, Chillicothe, Missouri.*

Food of the Short-eared Owl During Migration Through Pennsylvania.—Since July 1, 1938, the food habits of all raptors on the 1,675-acre Ring-necked Pheasant (*Phasianus colchicus torquatus*) study area in Lower Macungie Township, Lehigh County, Pennsylvania, have been investigated by the Pennsylvania Cooperative Wildlife Research Unit for the purpose of determining the effects of birds of prey upon the pheasant population. The Short-eared Owl (*Asio flammeus flammeus*) rarely breeds in Pennsylvania, but it is often observed during migrations. At least four times during the course of the pheasant investigation, groups of migrating Short-eared Owls hunted and rested on the study area for several days at a time.

The owls usually roosted in weedy grain stubble fields during both spring and fall migrations. Seventy-two pellets, from at least 14 different owls, were collected from roosting sites on the study area. Eighteen pellets were collected in November 1938; 42, in March and April 1939; and 12, in September 1939.

The analysis of the bony contents of the pellets yielded the following items of prey: meadow mice (*Microtus pennsylvanicus*), 98; deer mice (*Peromyscus* sp.), 26; house mice (*Mus musculus*), 3; short-tailed shrew (*Blarina brevicauda*), 2; Flicker (*Colaptes auratus*), 1; unidentified small birds, 3; and frogs (*Rana* sp.), 4.

Although the data were meager, there was no significant variation between spring and fall food habits. During both migrations mice appeared to be the staple food, while other items of prey were merely incidental.—PIERCE E. RANDALL, *Department of Zoology and Entomology, The Pennsylvania State College.*

Unusual Behavior in the Chimney Swift.—Birds, as well as many other animals, have been observed to behave very differently in large groups than when alone. Under the influence of the social situation they may lose their accustomed fear and caution as is well shown by the following incident. In the late afternoon of Sept. 1, 1936 in Waldoboro, Maine, I observed Chimney Swifts (*Chaetura pelagica*) circling overhead in large numbers. They flew lower and lower until one side of their circle was barely skimming the ground. A tennis backstop of chicken-wire now stood directly in their path and into this they crashed blindly. At first they tried to pass between the meshes with their wings flapping. They would neither turn around nor fly over the obstruction. They seemed imbued with a mob psychology, a feeling that they must follow their companions regardless

of consequences. After a few seconds struggle each bird learned to fold its wings and passed through the meshes of the backstop, but not before I was able to pick numerous specimens from the wire. Once grasped, the swifts lay quietly in my hand, and when released while lying on their backs made no attempt to escape. When turned on their bellies, however, they immediately flew away.

Our presence in the edge of their circle did not seem to frighten the swifts in the least. In fact I was startled to feel one of the birds brush through my hair, while my companion was twice struck in the legs and once on the head by the birds. Even when taking into account the fact that the onset of the migration season had strongly stimulated the gregarious instinct of the swift, it is surprising to find so excellent a flier actually colliding with human beings in the daytime.—HARVEY B. LOVELL, *Biology Department, University of Louisville, Louisville, Kentucky.*

Sex Ratio and Weights of Crows Wintering in Oklahoma.—These notes on the sex ratio and weights of Crows were recorded near Binger, Oklahoma where employees of the Game and Fish Commission had bombed a large roost on the night of December 6, 1938. An estimated 18,000 crows were killed. Measurements of Crows wintering in Oklahoma show that both *Corvus brachyrhynchos brachyrhynchos* and *C. b. hesperis* are present but the latter is dominant.

On the morning following the bombing the writers collected 100 birds from each of 10 areas. These areas were selected at points throughout the roost in order that all parts should be represented in the total collection of 1000 crows. There was no hand picking of specimens, for in each chosen area we collected every bird, excepting only a few that were mangled.

Of the 1,000 birds sexed, 526 (52.6 per cent) were males and 474 (47.4 per cent) were females. Since the number of males in each group of 100 birds varied from 41 to 65 and the females from 35 to 59, it is evident that such a number is not great enough to determine sex ratio accurately, even in such a heterogeneous group as the occupants of a Crow roost. We believe that fully 1,000 birds are necessary.

The average weight of the 526 males was 1.05 pounds and that of the 474 females was 0.93 pound. These weights were carefully taken with a Chattilon's milk scales, but because of a certain loss of blood they are somewhat less than the live weights of the same birds would have been. However, the loss of weight by bleeding was apparently no greater among these bombed Crows than it would be among birds collected with a gun.

The following table shows the number of males and females and the total weight of the birds of each sex in each group of 100 Crows:

Group number	Number of males	Weight in pounds of males	Number of females	Weight in pounds of females
1	41	43.15	59	55.10
2	50	52.85	50	46.15
3	65	67.90	35	32.35
4	54	56.10	46	42.25
5	52	54.55	48	44.25
6	54	57.80	46	42.50
7	55	57.50	45	41.85
8	50	53.00	50	47.45
9	53	55.50	47	43.20
10	52	55.15	48	44.90
Totals	526	553.50	474	440.00
Average weight		1.05		0.93

RALPH H. IMLER AND FRANK B. MCMURRY, *U. S. Biological Survey, Denver, Colorado, and Cache, Oklahoma.*

EDITORIAL

We are asking our contributors to try to avoid the indiscriminate use of trinomial scientific names. The trinomial was accepted only after much protest and many ornithologists held out stoutly against it for a long time, but, now that all resistance has been overcome and a generation that has never been without it has grown up and occupied the ornithological world, we seem to be going to the other extreme and are tending to use trinomials on every possible occasion, whether we mean anything by them or not. Remember that the binomial is perfectly respectable. If you live in the Southwest, for example, and are a student of the breeding habits of birds, send us that paper on the nest-building habits of *Spinus psaltria*, but don't call it *Spinus psaltria hesperophilus* just because you judge from the A.O.U. Checklist that that *must* be the form found in your region; and do not, above all, fall back on that clumsy and wholly useless subterfuge of speaking of the "Arkansas Goldfinch (*psaltria* group)." Your notes actually refer to the habits of *Spinus psaltria* at Centerville. Any other label is based on gratuitous assumption, as you will realize when you eventually discover how many birds occur at Centerville all unknown to the A.O.U. Checklist.

As the editorial year comes to a close we wish to express here our grateful appreciation of the advice and assistance received from Helen T. Gaige, Thomas D. Hinshaw, Milton B. Trautman, and Leonard W. Wing.

The Club is much indebted to its long-time member and former Editor, Frank L. Burns, for his recent, very generous gift of one hundred rare early numbers of the *Bulletin*.

Contributors to *The Wilson Bulletin* are requested to follow as fully as possible our established format. They should *not*, however, mark on manuscripts the type for the printer to use; that practice usually results in making the Editor's task harder instead of easier.

Again we urge members to notify us promptly of changes in address. The failure of some members to do so adds greatly to the Club's postal expense.

Ornithological News

Frank A. Pitelka will serve as teaching assistant this year in the University of California Department of Zoology at Berkeley.

Robert C. McClanahan has been added to the staff of the Section of Distribution and Migration of Birds of the U. S. Biological Survey.

Dr. Louis B. Bishop has given his great collection of North American birds to Field Museum of Natural History, Chicago. Dr. Bishop's collection was said to be the largest American collection in private hands.

George N. Rysgaard is now a graduate assistant at the W. K. Kellogg Bird Sanctuary, Battle Creek, Michigan.

Homer L. Bradley has been transferred by the U. S. Biological Survey to Havana, Illinois and placed in charge of the Chautauqua Waterfowl Refuge.

WILDLIFE CONSERVATION

"NUISANCE REGULATIONS." A recent article in *Time* magazine implies that the current federal waterfowl regulations are "nuisance" measures, and unnecessarily restrictive.[1] No doubt written with intent to please some shooters, this news item serves best as a reminder to us that the fight for wise waterfowl management is by no means over; it has only started! The "nuisance" restrictions provide the earlier (4 P.M.) closing hour, lower bag limits, only 45 days open season and include the ban on live decoys and baiting. (Formerly the season was 3½ months and the closing hour was sunset.)

The bag limit reduction (from 25 ducks a day to 10 per day) must save some birds; but to the ducks it matters little whether one shooter bags 60 birds or six shooters take ten apiece! It is the total kill that counts. Wild geese decoy readily to paper silhouettes, and winter wheat fields and corn stubble are legal "baiting." During the 1936 fall flight, large numbers of Blue and Snow Geese were shot in Michigan during their unusually long stay; and in 1939 the Canadas were similarly bagged in southern Michigan in numbers far greater than customary. *Changing habits of these birds may create new hazards for them and require even more stringent regulations.*

In all but perhaps a few items, the U. S. Biological Survey is to be upheld in its stand on waterfowl protection. A daily allowance of 25 Coots, for example, seems to us unnecessarily large. Coots may occur in great concentrations at a few places, but also they are scarce in many marshes. They eat some of the foods that ducks eat; but it has not been proved that other waterfowl need or miss what the Coots take. With additional reductions probably in order in the legal daily bags of ducks and geese, raising the legal bag limit on the Coot seems like lost ground.

LOCAL BIRD PROJECTS. Probably in conservation fields that vague something called "public education" is best accomplished not by printing bulletins or giving lectures alone, for at best these reach but few people. We need local projects, such as bird sanctuaries and trail-side museums! In many States a mushroom-like growth of local and county-wide conservation clubs is taking place. It usually starts with a fish hatchery or a branch pheasant farm, or possibly a skeet shooting ground or a club house where dinners and dancing are paramount. Properly cared for aviaries and small zoos of native animals may serve well in club or municipal programs to entertain and instruct the public in wildlife conservation. His interest aroused, each person then becomes a possible reader of bulletins or nature guides. Ornithologists should study local conservation moves, keeping a friendly yet critical attitude. Eventually the opportunity will come to be of some specific aid in promoting or advising on community wildlife projects. The past summer at Augusta, Michigan, a new Conservation Club settled a program dispute (pheasants versus a fish pond) among its members by heeding a suggestion that they start a community picnic ground, adding a few geese or ducks, some bird houses and feeding stations for year-round interest. The idea took hold, caught their imagination, and they really enjoyed every step in developing their project. Plans now call for an exhibit of Wood Ducks and Mallards in a neat enclosure on the creek. A bird sanctuary, nature trails, tree labels and other interesting exhibits in a natural setting are on the way. Is not that the spirit of out-door activity? But as yet few villages or cities have any such development. Why should not our members propose and help with many such local projects?

"CALLING ALL BANDS." The conservation of any wild species depends on a thorough knowledge of its natural history. Thousands of gulls, terns, and ducks have been leg-banded. Even the Prairie Chicken and Crow have been banded in fair

[1] *Time*, Oct. 23, 1939: 60.

numbers in the north-central States; for bird banding adds to our findings on annual mortality, flight lanes, and manner of dispersal. The success of these studies depends on the reporting of recovered bands, and this in turn depends on an interested and informed public. Wilson Club members can help greatly by repeating the story of why birds are banded and to whom and where the recovered bands should be reported. Urge your Game Department to include a "call for bands" in its digests of game and fish laws which are given to buyers of hunting and fishing licenses. Tourist-resort publicity might well carry stories of local bird studies and the significance of the colored or aluminum leg bands on gulls and ducks.

SHOOTERS MAY LEARN. The following news item has been received from Richard A. Pough, in charge of the National Association of Audubon Societies program to help save predatory birds:

CONSTABLE IS FINED $50 FOR KILLING EAGLE

Hendersonville, Oct. 12. (Special)—Green River Township Constable H. B. Davis was fined $50 and costs Thursday by Magistrate Guy Jordan after pleading guilty to killing a bald eagle, a protected bird under the game laws.

The warrant was taken by Game Warden S. S. Whitaker, and Special Agent W. R. McLean, of the State department of conservation and development, who came here for the investigation.

Mr. McLean emphasized that it is a serious violation of the game laws to kill a bald eagle.

Excerpt from the *Asheville* (North Carolina) *Citizen* of Oct. 13, 1939.

In December 1938, Edward K. Love of St. Louis established a $100,000 foundation for wildlife conservation in Missouri. The income from this fund is being used for several purposes: Scholarships and cash awards to 4-H individuals and clubs and to members and Chapters of the Future Farmers of America; cash awards to county conservation organizations and high-school clubs; two graduate Fellowships at the University of Missouri for work on a problem relating to the furbearers and on a problem in aquatic biology; and others.

A conservation poster contest, sponsored by the Illinois Junior Academy of Science in May of this year, brought out about 25 posters by high school students on various conservation subjects. First prize was a colored poster on protection of hawks. This was submitted by one of the judges, Dr. D. H. Thompson, to the *Illinois Sportsman*, a privately published outdoor magazine of about 20,000 circulation, and was recently published.

From Mississippi Fannye A. Cooke writes, "In addition to the educational program inaugurated by the Mississippi Game and Fish Commission, we have had through W.P.A. federal aid an opportunity to sponsor a program which is fitting teachers in the State colleges to teach conservation and nature study in the public schools. While these teachers are being trained, we are introducing popular nature projects in the schools of nearly all of the counties and in the summer camps. The program provides also for the building of museums of natural history at each of the State colleges. It also provides for a biological survey of the vertebrates and flowering plants. These surveys are being made under the supervision of the research assistant of the State Game and Fish Commission."

—WILDLIFE CONSERVATION COMMITTEE

Miles D. Pirnie, Chairman

ORNITHOLOGICAL LITERATURE

BIRDS AS ANIMALS. By James Fisher, with a foreword by Julian Huxley. Heinemann, London & Toronto, 1939: 6 x 9 in., 281 pp. 12s 6d.

This is an ambitious book, as will be seen from the chapter headings, all of which start with "Bird" and deal with the following topics: historians, history, adaptation and habitat selection, variation and distribution, environment, habitat, numbers, migration, colours and display, territory, and reproduction with a final chapter on "Birds and Man." There are six or seven hundred references (802 are listed, but some are repeated a number of times) and an index of species, but unfortunately no index of subjects.

The book is written chiefly for the amateurs in the British Isles who are doing such fine work in field ornithology; it will prove helpful to other students also in providing background and in summarizing the progress made in many fields, particularly in ecological relationships. On the whole Mr. Fisher has succeeded admirably with his ambitious task.

There are a number of typographical errors as well as some errors of fact. The author states, "In most ordinary waders the female broods and cares for the young" (p. 192), whereas in many cases these tasks are shared by the parents or undertaken by the male alone. He voices the popular opinion when he says, "Excepting those birds which nest colonially, the young, as soon as they can fly efficiently, leave their parents or are driven away." Many passerines fly fairly well at 17 days, but are fed by their parents till they are about a month old.

Mr. Fisher says, "There is no record of any kind of bird which breeds in the same season as that of its birth" (p. 166). In captivity a number of species have bred at ages of 2 to 4 months; these are tropical birds and their behavior in this respect in the wild is not known (Steinbacher, *Beitr. z. Fortpflanzungsbiol. d. Vögel*, 12, 1936: 139).

It is a pity to paraphrase an author incorrectly, but it is worse to put such a statement in quotation marks. I have never said "Female song-sparrows show no territorial behaviour at all" (p. 159). They never in my experience hold territory alone, but they help their mates defend the territory, even before nesting starts, and this I distinctly call "territorial behavior."

Mr. Fisher has correlated and presented a mass of interesting and useful information, with credit given to authors and full references included. It will help many students to orient themselves in the field of biology. In his foreword Mr. Huxley says, "Indeed, I should imagine that many professional zoologists will be surprised at the contribution to basic biological problems which are being made by ornithology. In some of these fields, birds have provided the material for greater advance than has any other group of animals: in none of them are they out-distanced."—M. M. Nice.

CHECK LIST OF BIRDS OF DALLAS COUNTY, TEXAS. By Jerry E. Stillwell, 7460 San Benito Way, Dallas, Texas, 1939, 3rd ed.; 6 x 9 in., vii + 83 pp. $1.00.

The publication of a third edition of this extensive list of Dallas County birds is welcome evidence of the active study now being made of the long-neglected birds of northeastern Texas. The author and his associates, to whom he carefully gives full credit, have expended a great deal of effort on this rather elaborate and extremely condensed summary of the known status of 339 forms of birds in Dallas County. It is therefore hard to understand why they have left still undetermined the status of such common and easily collected birds as Meadowlarks and Flickers. The additional listing of 117 forms "as of possible occurrence" seems ill-advised in a faunal list in which space-saving devices have been employed to the point of making the text hard to read without considerable study of its many symbols and abbreviations.—J. V.

THE PRIVATE LIFE OF BIRDS. By Henry Smith Williams. McBride, New York, 1939: 5½ x 8½ in., 270 pp. $3.00.

The Baltimore Orioles, Robins, Kingbirds, Catbirds and Cedar Waxwings on the Williams' sanctuary in southern Connecticut have built some extraordinary nests from the colored yarns provided by their hosts; the description of these experiments is the most valuable portion of the present book. It is a pity that colored plates of the nests, some of which have appeared in magazines, could not have been used for this volume instead of the all too familiar prints from the National Association of Audubon Societies, good as those were for their original purpose. The Williams did no banding (p. 96), more's the pity. We may accept their identification of the same oriole three years in succession by the individuality of her building, but what shall we make of this statement concerning the population of 1926 and 1927?

"The fledgelings of the new generation were born iconoclasts. In the veins of all of them, perhaps, flowed the blood of the innovator of 1923. Hereditary genius was their uniform endowment." (p. 98.) The supposition that the "eight or ten" female orioles of 1926 might be daughters, granddaughters and great granddaughters of the "innovator" is not supported by the results of banding other passerines.

Dr. Williams inveighs against "furry marauders" (fox, raccoon, skunk, and red squirrel), against black snakes, and particularly against "that worst of all enemies, the Cowbird." (p. 68.) We are told of the way in which the "golden warbler" meets the emergency by habitually building a second story to its nest, and it is suggested that the wide distribution of the "golden warbler" may be due to its having "learned how to circumvent the intruder." There is an interesting account in the *Auk* (1916: 178) of Henry Mousley's finding of a Yellow Warbler's incubating four of her own eggs and a Cowbird's egg, while one of her own was imbedded; Mr. Mousley removed the Cowbird egg ,and raised up the warbler egg; three days later the parent warbler had embedded two of her own eggs. Herbert Friedmann, in his book on "The Cowbirds," tells us in regard to this species, "Cowbird eggs are frequently accepted if any Warbler's eggs are in the nest." As to correlation between wideness of range and success in outwitting the Cowbird, the Song Sparrow possesses an enormous range, despite its being victimized "over a greater area than any other species" (Friedmann) and the fact that in many places it raises more Cowbirds than does any other species.

The book is a curious mixture; there are some important facts presented, such as the statement that "about half of our orioles each spring are year-old birds (known by their lighter-colored heads)" (p. 95), these young birds starting to build a week or ten days later than "their elders." (p. 103.) Many of the author's views are sound, yet time and again his imagination takes the rein. "Obviously, they [Starlings] appointed one member to remain and keep the bluebirds dispossessed." (p. 161.) (We are not told how such an appointment might be effected.) It is naive to believe a bird sings to cheer the nesting mate, but instead of the territorial interpretation of song we are given the following "plausible idea": "that the songster, perched at a little distance from the nest, designs to attract the attention of any chance predator to himself; by the same token distracting attention from the more important member of the family and her precious eggs or nestlings." (One wonders why it wouldn't be wiser to keep still.)

There is a chapter on "Dressing Dangerously," explaining color in plumage on the basis of feminine passion for bright colors. "It is hard on the males, and may even jeopardize the race; but the aesthetic eye must be served." (p. 238.) An oriole "profited by her own mistake—and whoever can do that, can reason." (p. 127.) But a cockroach can be trained to run a maze, "brainless animals can profit from experience, and even the naturally ganglionless starfish learns." (R. Knight, *Nature*, 130, 1932: 650.)

The study of birds is a large field; no one person can hope to master it by himself. Why not avail one's self of the experience of other students as related in *The Wilson Bulletin, Bird-Banding,* and the *Auk?*—M. M. Nice.

ZUR ÖKOLOGIE UND VERBREITUNG DER SINGDROSSEL (TURDUS ERICETORUM PHILOMELOS BREHM). By Lauri Siivonen. Ann. Zool. Soc. Zool.-Bot. Fennicae Vanamo, 7, No. 1, 1939: ix + 285 (Summary in Finnish, pp. 286–89), 42 figs., 10 maps, 24 tables.

A comprehensive, thoroughly organized, and well-documented report on a 1934–39 study of the ecology of the Song Thrush. Breeding and wintering ranges and migrations are discussed and mapped. In recent years the species has extended its nesting range northward and has remained in winter in areas previously unoccupied at that season. These phenomena are in accord with observed improvement in the north European climate. The breeding range lies mostly in pine- and spruce-clad regions but takes in some broad-leaved forests. It almost completely incloses the ranges of *Picea excelsa, P. omorica,* and *P. orientalis* and is well correlated also with the distribution of certain herbs. Abundance of the birds and size of their breeding territories varies greatly with the type of environment. Open spruce forests and mixed woods rich in spruces are most favorable, supporting up to 15–20 (and locally even 50) pairs per square kilometer (247.1 acres). Other environments, including areas modified by man, are described and rated.

The Song Thrush invariably has a definite breeding territory in which representatives of other species, even of thrushes but not of its own kind, are tolerated. The nest usually is in a dense spruce and the materials locally gathered often camouflage it effectively. Its height from the ground is mostly from 1–3 meters (highest 12 m.) and it is most frequently placed against a trunk or among thick branches where it is protected from rain. It is also well shaded, the average site being only about a third as well lighted as those chosen by the Mistle Thrush. Materials and construction of the nest are described and illustrated. Variation in the number of eggs is thoroughly discussed, but little correlation with environmental factors is disclosed; the number of broods, however, increases from north to south. Incubation usually lasts 12–14 and brooding 13–14 days. Nest destruction varies with locality, being highest in the vicinity of man's dwellings; destroyers of eggs or nestlings include members of the crow family, especially jays and magpies, and in addition martens, weasels, dormice, snakes, ants, cats, and boys. The bird's songs are classified into five types that are discussed as affected by territory, breeding cycle, weather, intensity of light, and length of day.

In a section on nutritional biology, the author reviews the methods that have been used in studying and recording the food habits of birds and points out the desirability of making simultaneous investigations of available foods. He summarizes numerous earlier studies of the dietary of the Song Thrush and details the findings of his own researches, including both stomach analyses and field observations. The species consumes more animal food in the southern parts of its range and more wild fruits toward the north. Earthworms, snails, slugs, beetles, caterpillars, and ants are principal items of the animal diet, and fruits of *Vaccinium, Ribes, Empetrum, Sorbus,* and *Juniperus* leading articles in the vegetable subsistence. The food environment and feeding habits receive special attention, an interesting feature of behavior being the breaking of snails upon rocks that are habitually resorted to, the fragments of shells about these "anvils" conveniently indicating the bird's molluscan diet. The author inventoried available foods of sizes suitable for the Song Thrush in different types of environment at various seasons for the purpose of appraising utilization in relation to availability. But first he interposes results of a study of food preferences with caged thrushes from which he derives standards for an optimum diet. However the Song Thrush will

substitute for the most relished foods others less preferred, especially when these are abundant and readily obtainable. In other words, while the species has marked food preferences, they may be fully expressed only in the presence of all optimal foods. Preferences can be followed in many environments only so far as permitted by available supplies of which abundant sorts are likely to be most freely utilized. From his study of diet in relation to the kinds of foods present, he concludes that both regional and seasonal variations in utilization of food are in direct correlation with variations in the available supply. This is an interesting confirmation of the importance of availability (cf. *Smithsonian Misc. Coll.*, 85, 1932 : 135–136) but the intercalation of a theoretical optimum based on study of caged birds seems to add no strength to the hypothesis (cf. *Proc. Acad. Nat. Sci. Philadelphia*, 64, 1912: 356–364).

The author's term "optimal value of foods" appears to be only another way of expressing the familiar facts that birds are limited in their diets by their ecological ranges, by their sizes and capacities, and by their constitutional adaptations for collecting and utilizing certain types of food. Restricted by these dominating conditions, each kind of bird, as a rule, feeds in a more or less specific way in a limited environment, where in all likelihood the most plentiful edibles will be most freely consumed. This is the natural and practical thing, hence the rule. The bird may have preferences, but in the long run it is compelled by sheer pressure of circumstances to feed on available foods more or less in proportion to their abundance. The density of the Song Thrush population often seems to be in proportion to that of certain foods, as beetles, mollusks, and bilberries, but this principle does not operate to make the species as common in mature open deciduous woods, for instance, as it is in denser spruce forests, although the food supply may be equally great. The Song Thrush sometimes gets almost all of its food in a quite restricted part of its nesting territory, hence the author does not agree with Howard that quantity of food is decisive in fixing size of territory.

Concluding sections of the paper comprise a chapter on general behavior, a summary, and a 16-page bibliography.—W. L. McAtee.

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